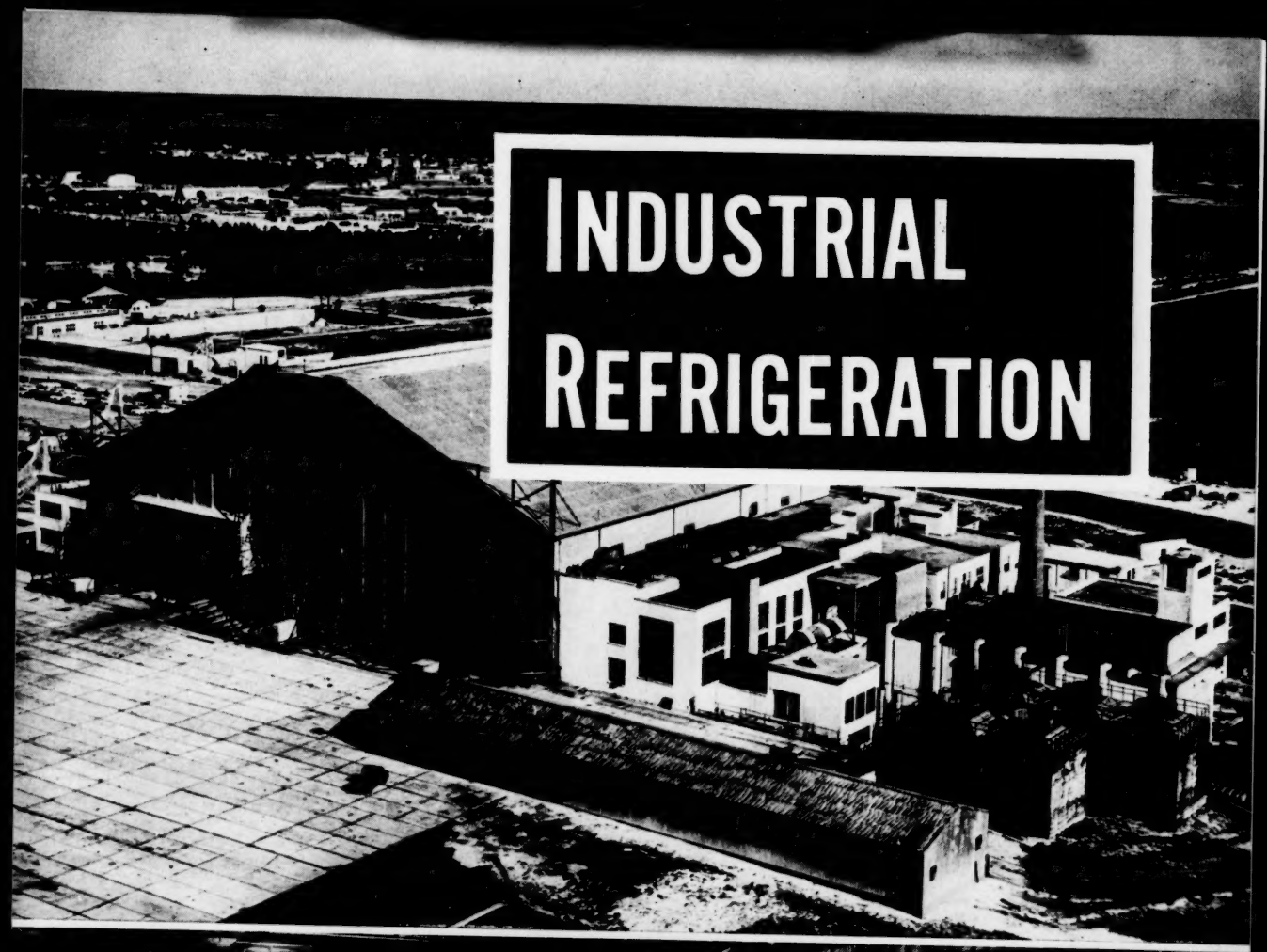
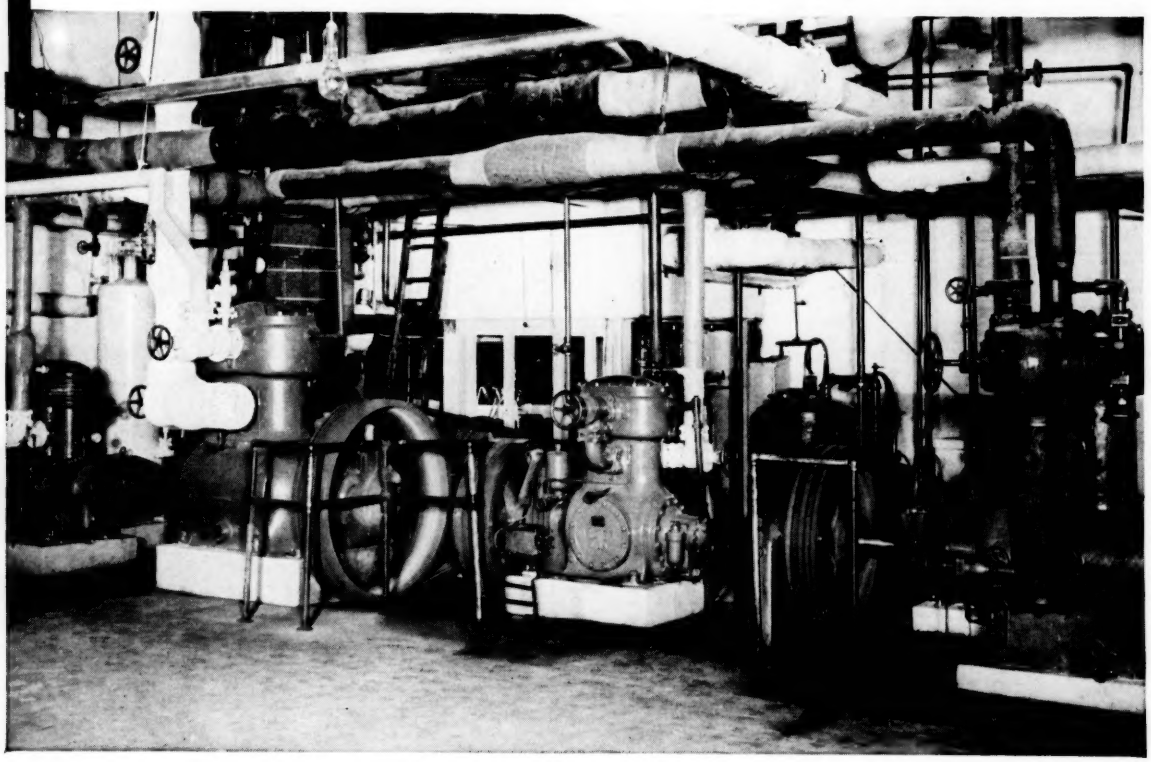
INDUSTRIAL REFRIGERATION



"Efficient Refrigeration, low maintenance expense"



THIS western ice and storage company (name on request) has used *Texaco Capella Oil* for years and reports: ". . . performance has been consistently dependable. Systems stay clean, valves and other vital parts function smoothly. The overall results—efficient refrigeration, low maintenance expense."

Texaco Capella Oil (Waxfree) is specially refined for compressor service. It exceeds Freon floc test requirements and the specifications of all leading refrigeration manufacturers. *It will not wax out* in systems even at temperatures as low as minus 100° F. *Texaco Capella Oil (Waxfree)* resists oxidation and foaming, retains its stability under the severest conditions. It is moisture-free and compatible with all refrigerants.

There is a complete line of *Texaco Capella Oils (Waxfree)* to meet every compressor requirement. Available in 55-gallon and 5-gallon drums, 1-gallon cans, and the more popular grades in 1-quart containers—all refinery-sealed to protect purity and quality.

Let a Texaco Lubrication Engineer help you get greater refrigerating efficiency. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N.Y.

TEXACO REG. T.M.

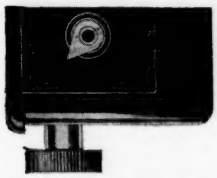
TEXACO Capella Oils (Waxfree)

FOR ALL REFRIGERATING AND AIR CONDITIONING COMPRESSORS

ELECTRIC Heating Cable DEFROSTERS

for LOW TEMPERATURE DOORS

1 • Temperature adjustment control.



2 • Adjustable thermostat for range of +85° to +245° F.

3 • Steel electrical outlet box for making connection between heating element and thermostat—inlet for power.

4 • Rabbeted channels into casing.

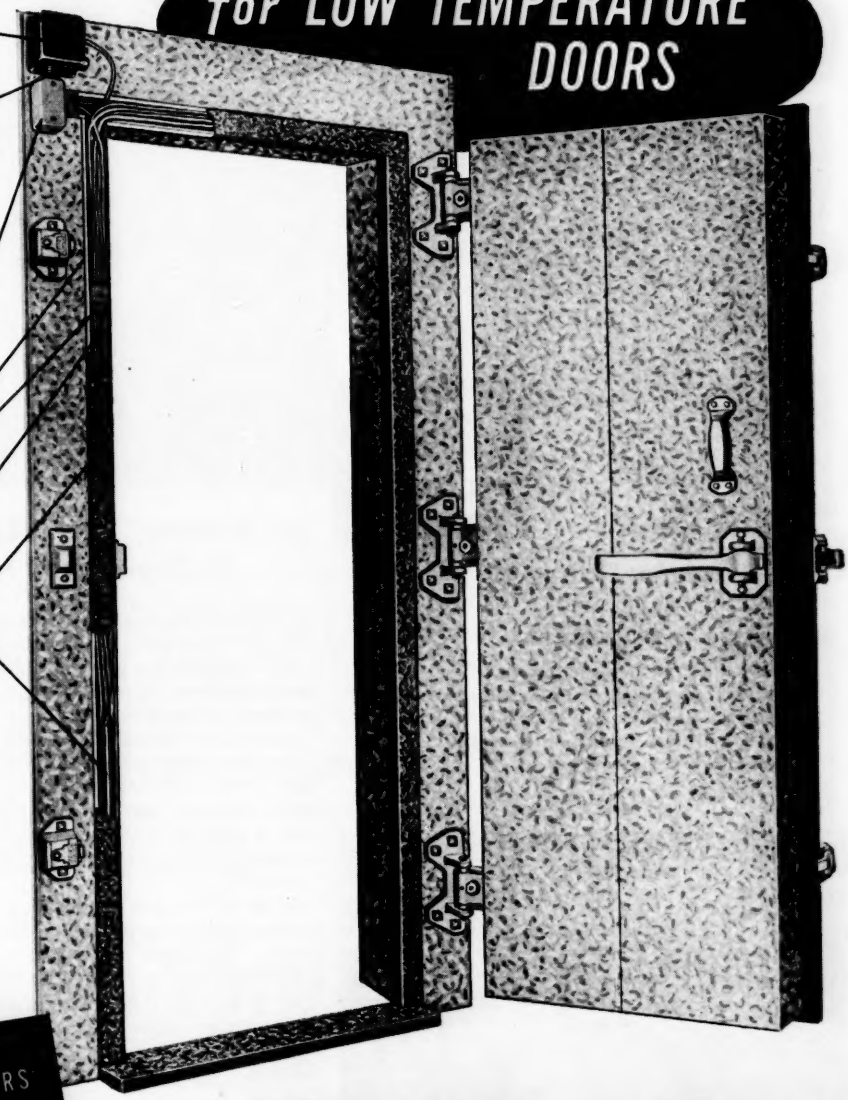
5 • Fireproof No. 26 gauge galvanized metal lined inside channel.

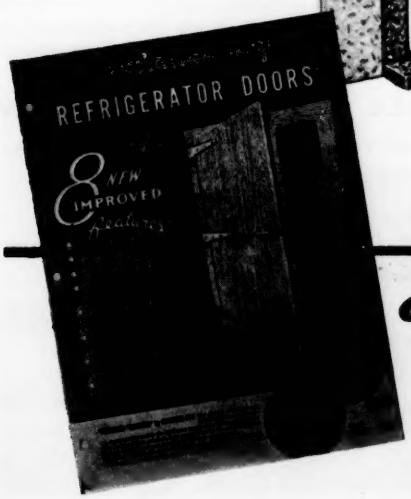
6 • Lead covered "heater cables" (4) held down securely by clips —approximately 20 watts to a foot. (110 volts—60 cycles).

7 • No. 10 gauge galvanized steel cover plates—removable.

8 • Capillary tube controls (on and off) thermostat.

The purpose of heating cables is to prevent icing conditions at the frame and sill areas where the door gaskets make their contact. The cables which are recessed into the frame casing are electrically heated and controlled by a "calibrated thermostat" (new improved feature by Butcher Boy), adjustable above the "dew point" of the air temperature. Since the heat expended prevents condensation it thus prevents freezing conditions.





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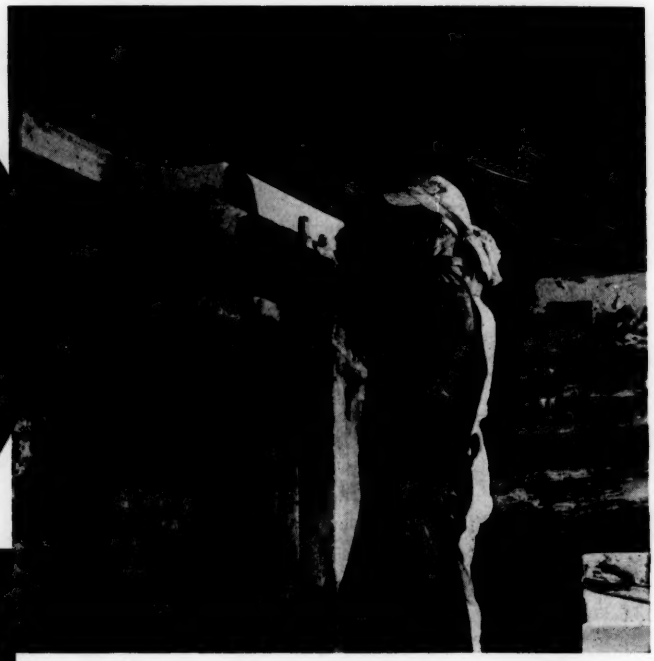

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SAVE up to 33⅓%

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NO *Skewering* • NO *Open Time*

FIRE-BAN Adhesive sets to rock-like hardness in a permanent bond that defies separation . . . even by force!

Direct Adhesion has proved its unfailing practicability on ceilings of poured concrete and pre-cast panels. A tenacious bond is assured also on firmly adhered cement plaster, cellulose board, rough lumber, Sheetrock and unfinished plywood. Fire-Ban Adhesive firmly bonds "Styrofoam" boards up to 6″ thick, also additional layers of "Styrofoam" with joints staggered.

Direct Adhesion may be applied to ceilings of non-porous surfaces such as metal, finished plywood or lumber, painted or asphalt coated surfaces by first preparing such surfaces with a quick coat of O'Neill's "Filmcote"

The use of Fire-Ban Adhesive on wall installations has long been accepted as standard procedure. The same Direct Adhesion to ceilings (where "Styrofoam" is specified) has already gained such wide acceptance that you will want to know the details.

WRITE AT ONCE FOR "BULLETIN 34" for full details, methods of application under varying conditions, costs, list of applications to date, etc. Specify if you want a "Bonded Sample" for testing. Address . . .

WRITE AT ONCE FOR . . .

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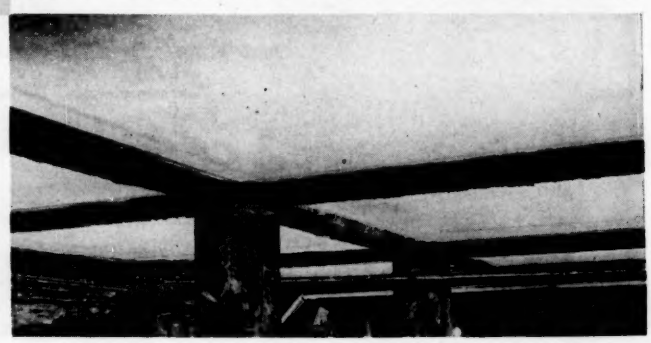

This photo shows Direct Adhesion to a ceiling of pre-cast panels; the photo at the top of the page shows application to a ceiling of poured concrete. Requires nothing more than a quick application of Fire-Ban Adhesive to both contact surfaces and the "Styrofoam" boards are simply pressed into position. That is all! The adhesive sets in approximately 24 hours and the bond becomes inseparable.

• • •

Photo at right was taken immediately after the insulation was coated with Fire-Ban Finish. This permanent, stone-hard, washable surface coating (the non-combustible coating "listed" by U. L. and considered "safe" for food plants by B.A.I.) is the number one consideration of engineers for ceilings and walls subject to extreme temperature conditions. For details of Fire-Ban surface coating, send for Bulletin No. 55.

STAND-OUT

Survey Shows Trends In Air Conditioning

A DEFINITE trend has developed toward air conditioning of industrial plants in the United States for employee comfort as distinguished from air conditioning purely for climate control for industrial processes, according to results of a survey by a leading air conditioning manufacturer. The trend is particularly noticeable in the South, where some consulting engineers have estimated that as many as 75 percent of new factories, and 50 percent of all factories, will be air conditioned for employee comfort by 1960, and that 90 to 100 percent of factories will be so equipped by 1970.

But the trend is spreading also to the North, particularly in factories involving high skills, such as the electronics industry. Factors in the trend include competition in industry for skilled help, the desire to maintain employee efficiency in hot weather, and pressure from labor unions.

One of the industries in which the trend is at its fastest is the textile industy. Consultants in this field estimate that 20 percent of floor space is air conditioned with refrigeration today as against one percent 10 years ago. This is exclusive of spaces using evaporative cooling, and total floor space includes such areas as well as production space. Almost complete air conditioning of textile and tobacco manufacturing areas, it is reported from Greensboro, will be finished by major manufacturers by 1970 and by smaller firms probably by 1980. Very little new construction in either industry will go up by 1960 which is not fully air conditioned, it is reported.

Although textile and tobacco factory air conditioning often can be justified from a production standpoint (i.e., a maintenance of certain humidities for proper operation of equipment) actual inside conditions are specified which go beyond these requirements, with employee comfort in mind.

All sections included in the survey reported increased interest, but especially favorable outlooks are reported from: Dallas, "Public demands and union demands will pressure building owners to provide air conditioned spaces." Philadelphia, "Unions are very active in the program in the textile industry and are insisting on

(Continued on page 52)

Industrial Refrigeration

formerly **ICE AND REFRIGERATION**
Now in its 65th Year of Publication

J. F. NICKERSON, FOUNDER

Vol. 131 **September, 1956** **Number 3**

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The Cover:

Refrigeration for the main hangar and the engine and equipment test room at the Eglin Air Force Base is furnished by centrifugal compressors arranged in three systems, each consisting of one high and one low-stage. The refrigeration in this facility totals 9,000 hp equipment. The nominal capacity of the three systems aggregate 750 tons at minus 95 F evaporator temperature. Heating for producing high temperature or low relative humidity is produced by two 320 hp 125-pound steam water tube boilers and one 90 hp fire tube boiler installed in a separate steam generating plant.

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What's New

MACHINERY
APPLIANCES • PROCESSES

New Liquid Pressurizer

LATEST product in the J. E. Watkins line of equipment for economical operation is the Watkins Liquid Pressurizer. The purpose of this equipment is to maintain liquid supply at constant pressure and constant temperature, sub-cooled.

The unit consists of a small compressor with motor of low horsepower for maintaining pressure on a surge tank which is connected to another shell, dammed in two parts. Through the valving arrangement pictured in the illustration, a predetermined pressure is maintained on the system while liquid from condensers or receivers in the system alternately fill one side and then the other of the divided shell. While one side is filling at a lower pressure from the condensers or receivers, the opposite side is under the higher pressure from the surge tank and delivering solid liquid to the system.

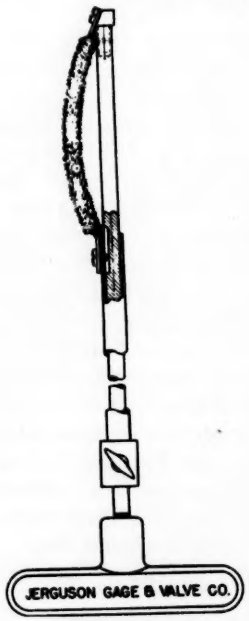
The Watkins firm maintains that the Liquid Pressurizer will enable an operating firm to reduce annual power costs as they will be able to take advantage of lower condensing pressures. Liquid supply to the evaporator in the system will be serviced at a constant pressure all year round, regardless of condensing pressure. Other advantages are offered in the application such as more nearly uniform temperatures, no change in expansion valve settings, no increase in liquid lines to cut down pressure drop and no shut downs for liquid line changes.

The company offers to provide specifications free of charge to any firm providing the following information.

(1) Tonnage and type of Condensers:
(a) If evaporative, maximum and minimum wet bulb at location.
(b) If water or air-cooled, maximum and minimum water or air temperature.
(2) Tonnage of compressors at each suction pressure (specify pressures).
(3) Minimum liquid pressure needed to feed evaporators.

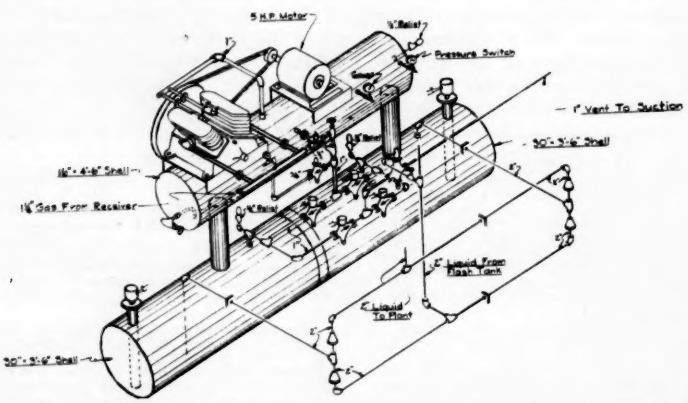
New Cleaning Rod

A NEW cleaning rod for the inside of liquid level gage glasses is announced by Jerguson Gage & Valve Company, Somerdale, Mass. This new type rod fills a need for a device to really get



The new Jerguson Cleaning Rod

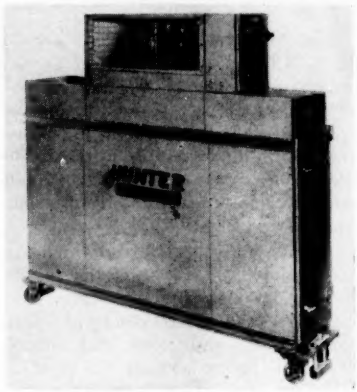
the inside of gage glasses clean. It uses a cloth swab on the end of a rod. The cloth swab can be brought to bear against the inside of the glass to remove stain, etc. Operation consists in slipping a tubular cloth swab over a piece of corrosion-resistant spring steel on the end of the rod. A detergent or other cleaning medium is applied to the swab and the rod is then inserted into end connection of the gage or the drain in the offset of a valve. When the swab is visible in the glass, simply pull back the handle and tighten the thumb screw. The result is an increased arc of the spring which forces the swab with the cleaning medium snugly against the glass and allows a good cleaning job with little or no effort. Standard length is 36 inches.



Sketch of Watkins Liquid Pressurizer For 1000-Ton NH_3 Installation — Patent Applied For.

Portable Cargo Cooler For Piggy Back Operations

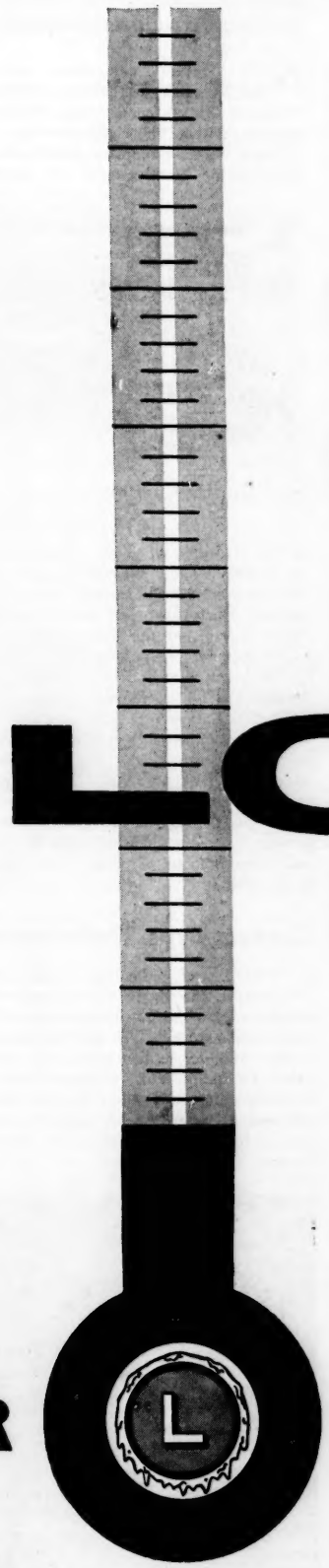
THE special requirements of piggy-back operations for refrigeration equipment have led to the development of a portable model of the Hunter Cargo Cooler designed and built by the Hunter Manufacturing Co., Solon, Ohio. The new Hunter unit, Model 83-1-X Portable, a thermostatically controlled, forced-air-circulation system with 21-block, 1050-pound dry ice capacity, is engineered to provide easy installation and removal as required in trailers employed in piggy-back routings.



Portable Hunter Cargo Cooler

Mounted on steel casters, it rolls easily into place in the rear of the trailer after cargo has been loaded. Weight of the unit is quickly transferred from the casters to spring-loaded leveling jacks for solid support on the floor. Brackets on the rear of the unit provide for easy attachment to the side of the trailer. Thus easily installed the unit is then connected to power source and is ready to go.

The Model 83-1-X Portable Hunter Cargo Cooler employs three axial-flow blower fans circulating air at 1500 CFM. The unit operates on either 12 volt DC or 115 volt AC. The blowers are positioned so that each moves air in a different direction, providing thorough circulation of refrigerated air throughout the cargo section. One blower circulates an air stream directly toward the front of the cargo space, the second to the front corner diagonally opposite the unit and the third directly across the width of the trailer. Lading is thus continually enveloped in a blanket of circulating refrigerated air. Thermostat control range is from minus 10 F to 60 F. The control box is mounted on top of the cooler alongside the blower fan housing, making the entire assembly a completely integrated easily portable unit. It is 74 inches high, 72-¾ inches wide and 15-⅜ inches deep and weighs approximately 500 pounds when empty.



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TEMPLETS come in the form of little green tables. There is no extra work required in using them. Just drop two or three tablets into each can and that's all there is to it. The results will show up in your having a stronger ice cake that does not readily crack, break or chip. You will also have a clearer cake. TEMPLETS completely or partially eliminate white butts, heavy cores and cloudy veils. Your ice will have more "sales-appeal." TEMPLETS leave no taste, no odor, no color.

You will also find that by using TEMPLETS you can make more ice during the peak summer months in the same number of cans. Because TEMPLETS reduce cracking and breaking in the cakes, you can freeze raw water at lower brine temperatures, use the cans more often and make more ice.

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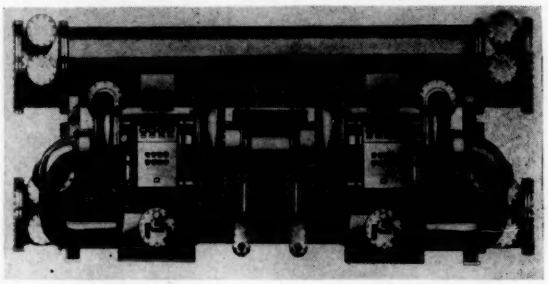
New Duplex Centravacs For Larger Air Conditioning

NEW "Duplex" compressor water chilling units ranging in size from 800 to 1200 hp are being announced by The Trane Company for air conditioning installations demanding high tonnage capacities. The compressors are located on the same side of a single, large evaporator and condenser. According to the company, the new duplex units were designed and engineered so that



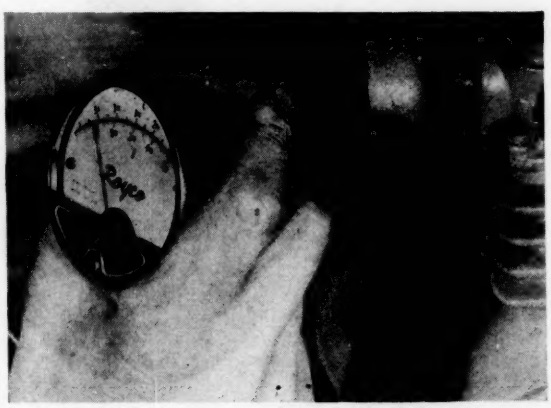
New Duplex Compressor water chilling unit announced by Trane Company.

all the features of Trane single-compressor CenTraVacs could be retained. These include capacity control, hermetic operation, minimum noise and freedom from vibration, automatic operation, positive lubrication, gas cooled motors and load limit control. Other features of the duplex chillers are lower current demand at starting, reduced power costs, and stand-by capacity.

The lower inrush current demand during starting is possible because the unit's two motors are arranged to start in sequence. This is an important advantage, especially in areas where power companies, or other conditions, impose limits on the maximum allowable inrush current for motor start-up. Duplex CenTraVacs offer economical operation. The compressors operate in sequence and can perform singularly or together depending on the refrigeration demand at any specific time.The fact that the two compressors can operate independently, permits most types of general maintenance to be performed on either, while the other continues to operate.

Contact-Type Thermometer

CAPABLE of indicating surface temperatures on a 1-second contact, the Royco Pyro-Couple offers a wide range of usefulness in checking the temperatures of liquids or solids including insulating materials. The unit combines a surface-contact thermocouple and an indicating meter damped for quick reading, shock resistance, and pointer stability. Waterproof construction of the stainless-steel probe permits use in a wide range of fluids. For special requirements, probes can be made any length up to 60 in. for such applications as scanning areas or volumes of liquids.



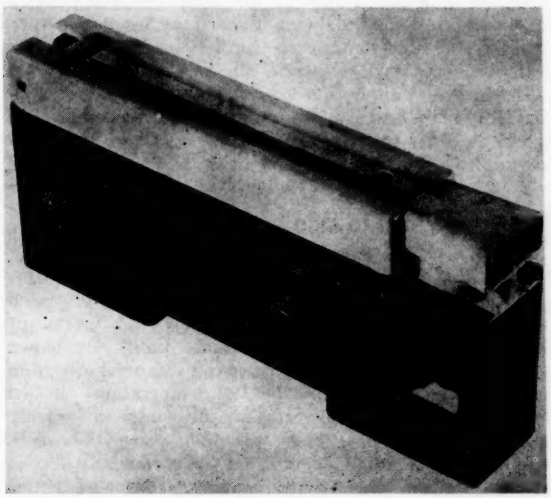
Surface-contact thermocouple with indicating meter

For convenience the scale is calibrated over its 0 — 650 deg F range in both Fahrenheit and Centigrade, scale accuracy being 2.5 deg F. (A 0 — 1000 deg F range is available, as well). The scales are linear with no crowding at the upper end of the 2 3/8-in. arc.

Other features include automatic compensation for ambient temperature permitting readings to be taken almost anywhere; complete portability due to freedom from batteries or external connections; an unbreakable plastic meter face and a screw-on probe-protecting shield. Total weight of the Pyro-Couple including shield is 12 oz and total length without shield 8 in. Maximum diameter is 2½ in.

New Psychrometer Developed by Bendix

A COMPACT, motor-driven portable psychrometer for determining relative humidity has been developed by the Friez Instrument Division of Bendix Aviation Corporation, Baltimore, Md. The self-contained precision instrument, named the Psychron,



The Psychron, battery-operated Psychrometer developed by Friez Instrument Division of Bendix Aviation Corp.

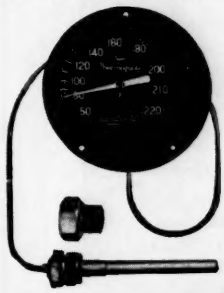
was designed to rigid government specifications for use by the U.S. Weather Bureau. In addition to its meteorological application, the commercial model will be useful in many other fields where temperature and humidity must be closely checked or controlled, such as air conditioning, refrigeration, heating industry, printing, food processing and preservation, textile, chemical and plastics manufacturing, building maintenance, horticulture, and tobacco curing and storage.

The Psychron, powered by three flashlight batteries, consists of a matched wet-and dry-bulb thermometer assembly ventilated by a tiny fan coupled to a motor. The thermometers attain an accuracy of plus or minus 0.3 degrees Fahrenheit at any point. Its advantages over the widely used sling-type psychrometer include easier and safer close-quarter operation and more precise aspiration rate. It also is immune from radiation effects of the sun, and has a built-in thermometer illumination system for easy reading in the dark. It weighs 2½ pounds, is 10 inches long, 4 5/16 inches high and 13/16 inches wide.

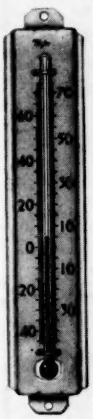
A three-bladed aluminum fan pulls in air at the rate of more than 15 feet per second across the thermometer bulbs, which are placed within a removable air intake that provides thermal shielding. Its built-in illumination system is of variable intensity, which provides easy reading of the thermometer, scales. Power for the unit is supplied by standard 1 and ½-volt D-size batteries. The Psychron operates in a relative humidity range of from 10 to 100 per cent, and a temperature range of from 10 to 100 degrees F. Standard acessories include a metal carrying case, a nylon neck strap, an instruction manual, psychrometric tables and slide rule. Spare thermometers, wicks, lamp bulbs and two-ounce water bottles are available as optional acessories.

Need thermometers? ...ASK TAYLOR

IF you do you can't do better than call your Taylor Field Engineer. He is a specialist in temperature measurement. And Taylor makes a wide variety of thermometers for just about every possible application in the refrigeration industry. If you prefer, write for **Catalog 300.** Taylor Instrument Companies, Rochester, N.Y., or Toronto, Canada.



THERMOGUIDE* Dial Thermometer
An extremely reliable and sturdy vapor-actuated instrument for Brine Lines, Brine Tanks, Ammonia Lines, Cold Storage Rooms, Refrigerators, etc. Variety of standard ranges from minus 40° to + 120°F. Four forms of bulb and connection. Case diameter 6½".
No. 14KV123, $38



Metal Wall Thermometer
Easily read, even in dimly lighted areas. Non-fading red liquid in magnifying tube and black figures and graduations on white background. Flanged edges give tube maximum protection. Range minus 40° to + 70°F., in 1° divisions. Length 12".
No. 1106, $2.75

Taylor Industrial Thermometer
Exclusive BINOC* tubing, makes it three times easier to read. For Cold Water, Brine, Ammonia, Condenser, Hot Water and Steam Lines, Brine Tanks, Cold Storage Rooms, etc. Many bulb and stem styles and angles. Ranges minus 40° to 950°F. or equivalent Centigrade. Illustrated,
No. 11ES385, $29.50

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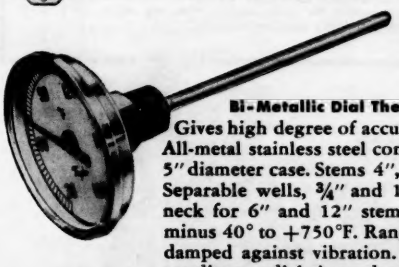

Bi-Metallic Dial Thermometer
Gives high degree of accuracy at low cost. All-metal stainless steel construction. 3" or 5" diameter case. Stems 4", 6", 9", and 12". Separable wells, ¾" and 1"; 2" extension neck for 6" and 12" stems. Ranges from minus 40° to +750°F. Ranges up to 400°F. damped against vibration. **$16** to **$26**, depending on dial size and stem length.

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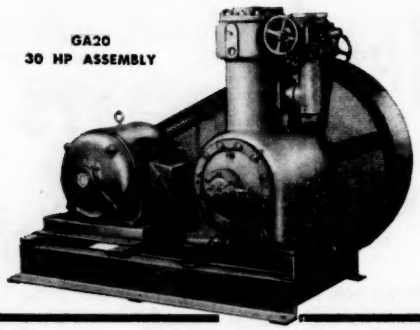
MEAN ACCURACY FIRST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Another **HOWE** *FIRST!*

HOLDS INSTALLATION COSTS WAY DOWN!

HOWE AMMONIA COMPRESSOR ASSEMBLIES, in capacities to 50 H.P. in both Standard and Booster models, are now factory assembled on steel base with drive and electric motor.

SAVE Special Foundation
SAVE Space
SAVE Installation Labor
SAVE Expensive Belt Guard

The same high quality — medium speed — long life — Howe Compressors are now built into a compact assembly. Makes possible finished installation in a matter of hours after delivery. The experience and know-how gained from 44 years of refrigeration equipment manufacturing backs every HOWE recommendation. Your inquiries are invited.

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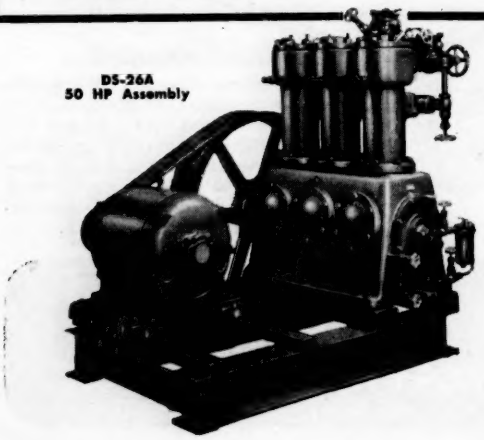
SINCE 1912, manufacturers of ammonia compressors, condensers, coolers, fin coils, locker freezing units, air conditioning (cooling) equipment.


DS-26A
50 HP Assembly

PRESS BRIEFS

Circus Turns to Air Conditioning

CIRCUS patrons throughout the United States received a bit of a sensation when they read on July 16 that Ringling Bros. and Barnum & Bailey combined shows, long billed as the Greatest Show on Earth, announced that it was discontinuing its operations under the Big Top. In Pittsburgh on that date, John Ringling North, Board Chairman of the World famed circus said "The tented circus as it now exists is, in my opinion, a thing of the past. We are considering plans for the future which may involve an almost completely controlled exhibition."

To explain his statement further, North said that an "all new 87th presentation of Ringling Bros. and Barnum & Bailey combined shows will open as usual on April 3, 1957, at Madison Square Garden in New York and will play the 1957 season in all air conditioned arenas all over the United States." Thus, one of the greatest outdoor shows on earth has turned to the air conditioned arena in order to attract the patronage it had previously enjoyed.

Storage Plant to Use Ice for Cooling

A NEW ice-cooled cold storage plant is being erected at the packing plant of Jack Radovich & Son, grape shippers, in Richgrove, near Delano, Calif. Air blown across bunkers of ice, replaced at regular intervals from ice trucks, will maintain the low temperatures needed to hold part of the grape crop for the winter and spring markets, when grapes bring premium prices. The cold storage plant, with a capacity of 50 carloads, will also precool grapes for current shipments to insure better condition on arrival at markets.

Just east of the Radovich plant, an entirely new operation is being completed for Louis Caric & Sons. This will include a loading and handling building in addition to the cold storage plant which will have a capacity of 100 carloads. This plant will be cooled by refrigeration machinery. Redwood bark is being used as insulation material.

Swift Buys Ice Cream Plant

THE BROWN Ice Cream Company, Ogden, Utah, has been purchased by Swift & Company packing concern according to a news report. Price was not disclosed. This move would put Swift into the dairy business in the Mountain West area. Brown's Ice Cream is one of the older established concerns in the state. Their ice cream is sold over the state of Utah and into Idaho. The production of butter could be one of the foremost reasons for Swift acquiring the Brown firm.

New Refrigeration Plant

CONSTRUCTION of a new plant in the southeast industrial area of Santa Ana, Calif., has been completed for the Santa Ana Refrigeration Company. Facilities of the old plant at 2901 North Main Street, in use since 1947, will be moved to the new location at 3005 Halladay Street, which has 6000 square feet of floor space and was built at a cost of approximately $40,000.

New Storage for Upstate New York

FORMATION of a new company, the Utica Refrigerating Corp., Utica, N.Y., has been announced with the purchase of a building at 21-23 Whitesboro St. by Gale A. Lytle of LeRoy, N.Y. Lytle is president and general manager of the Company, with H. C. Metzler of LeRoy as vice president and treasurer. Nicholas Bonanza has been named plant superintendent.

Extensive remodeling is under way. The building will be refrigerated and 75,000 cubic feet of refrigerated space is expected to accommodate the needs of Upstate New York customers. Lytle has been engaged in the frozen food business for 22 years, 15 of them in the sales department of General Foods Corp. For the last seven years he has been working with the Florida citrus industry on frozen citrus concentrates.

New Freezer and Processing Plant

A NEW freezer and processing plant is being erected at Blosser Road and Stowell Road in Santa Maria, Calif., for the Santa Maria Freezer and Cold Storage Company. The project, designed by Hugh M. O'Neil, engineer, of 610 Sixteenth Street, Oakland, Calif., is being built by Howson Brothers, Contractor of 738 North Monterey Street, Gilroy, Calif., and will include a freezer building with 61,600 square feet of floor space, a covered dock with 11,200 square feet of floor space, and two processing buildings. One of the processing buildings will have 40,000 square feet of floor space, and the other 16,000 square feet. There will also be a warehouse with 16,000 square feet of floor space, and an office building.

Frozen Food Volume Tops 1955 Levels

FROZEN FOODS distributors' sales are running ahead of last year, with the profit picture also generally brighter than was the case in 1955, according to a survey by the National Association of Frozen Foods Distributors.

Of the distributors participating in the survey, Harry K. Schauffler, executive director, reports 80 per cent said their volume the first half of 1956 was ahead of the 1955 period, with 73 per cent reporting higher profits.

In a similar survey made a year ago, covering the first half of 1955, a total of 90 per cent reported volume gains over the 1954 period and 75 per cent said that their profits were ahead.

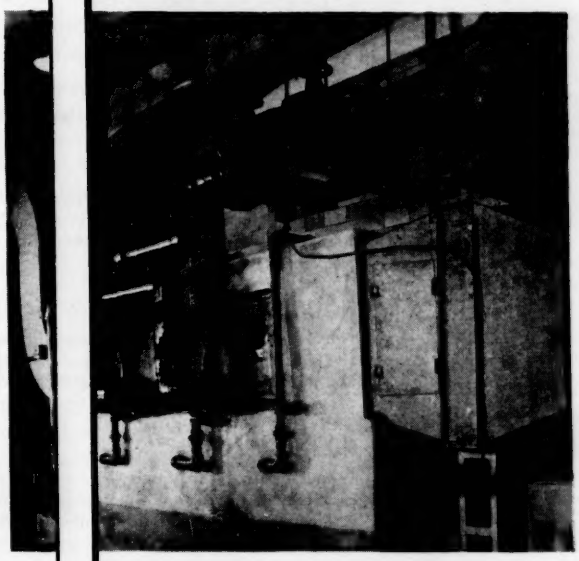
The average volume gain this year (counting both gains and losses) was 11 per cent. The average gain a year ago was 15 per cent.

"Of those distributors showing volume gains this year," Mr. Schauffler noted, "93 per cent also showed profit gains. A year ago only 75 per cent of those with gains in volume had matching profit gains. The explanation for this relatively better showing seems to be that the distributors now have a tighter control over expenses. Several of the replies mentioned that expenses went up only slightly, and not in proportion to the volume gains."

Gas Fumes Follow Explosion of Compressor Pump in Theater

TEN FIREMEN and two employees of the Fox Theater, St. Louis, Mo., were overcome by refrigerant gas fumes following an explosion of a compressor pump in the engine room of the theater at 527 North Grand Blvd. at 5:20 p.m. None of the 900 theater patrons were injured. The show was halted and they left the theater in orderly fashion after ushers and theater officials explained the situation.

GENUINE
OZITE
PIPE COVERING
INSULATION



CUTS POWER
CONSUMPTION

- APPLIES EASILY WITHOUT WASTE
- LOW CONDUCTIVITY FOR EFFICIENT HEAT BARRIER
- ALLOWS CLOSE TEMPERATURE CONTROL
- LASTS A LIFETIME

OZITE All-Hair felt is easy to install for curves, straight pipes or valves... applies without waste ... provides maximum capacity of refrigeration units... Ozite is practically indestructible.

Write for Bulletin No. 300

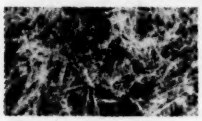
No shape is too complex

AMERICAN HAIR & FELT CO.

MERCHANDISE MART • CHICAGO 54, ILLINOIS

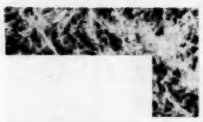
you can know it's with PALCO® WOOL

Thermal efficiency of insulating material is vital—and *Palco Wool* is tops in this department. But all the efficiency in the world won't help if there are heat leaks. With proper void-free installation of *Palco Wool* you can know that once-and-for-all you've licked the problem of heat leaks. Here's why:



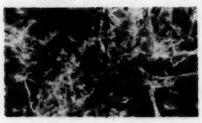
NO POCKETS OR VOIDS

Entire wall is insulated before interior finish is applied. Self supporting *Palco Wool* is then inspected to eliminate any possibility of pockets or voids.



NO JOINTS

Palco Wool forms a continuous insulating barrier, fills every nook and cranny—eliminates heat leaks due to improper fit at edges and around structural members.

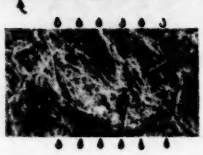


NO SETTLEMENT

Examine *Palco Wool* fibers. You will see the corkscrew-like structure which gives lifetime resilience and freedom from settlement. It's fully self-supporting.

NO CONVECTION CURRENT LOSSES

At recommended density of only 4.5 lbs./cu. ft., it displaces so much air that convection currents are virtually eliminated.



NO TRAPPED MOISTURE

Palco Wool is impervious to moisture effects and deterioration. It is installed with no intermediate vapor dams to trap moisture which would lower efficiency.

Specify Palco Wool, the only loose fill material listed and labeled by UNDERWRITERS' LABORATORIES, INC.—your assurance of regular inspection to meet their rigid specifications!

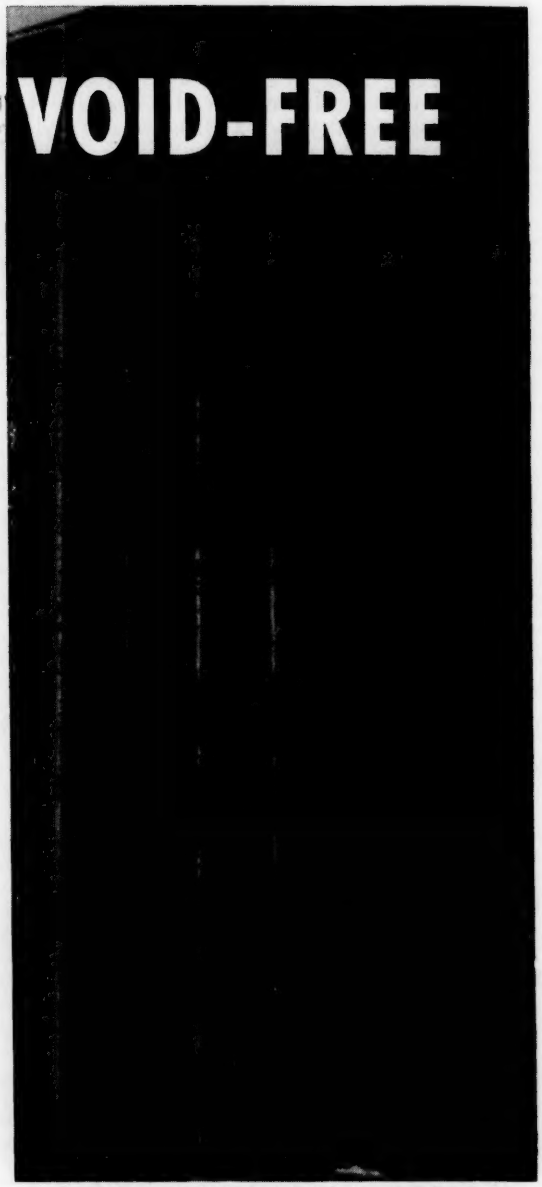
SEE THE NEW REFRIGERATION INSULATION MANUAL IN SWEET'S 1956 INDUSTRIAL CONSTRUCTION FILE OR SEND COUPON AT RIGHT FOR YOUR FREE COPY

THE PACIFIC LUMBER COMPANY

PALCO INSULATION WOOL®

100 BUSH STREET, SAN FRANCISCO 4, CALIFORNIA

VOID-FREE



Typical section of 27 ft. high wall shows how *Palco Wool* installed by proper void-free method remains in place for complete inspection before interior finish is applied.

THE PACIFIC LUMBER COMPANY

Room No. 2402 603

100 Bush Street, San Francisco 4, California

Please send me, without obligation:

- ☐ New complete Refrigeration Insulation Manual
- ☐ Sample of *Palco Wool* Insulation
- ☐ In-place test data on insulated structures

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In the Spotlight

READERS have habits of challenging reports or statements in all publications. Industrial Refrigeration readers are no exception. Early 1956 issues carried stories on improvements in vapor absorption plants for air conditioning and process applications. Several critical letters followed. Check-up by IR staff with readers, and users of these systems, brought out some very interesting comments. Interviews have been incorporated into a dialogue story. The first of two articles on this subject starts on page 13. None of the cast of characters in the story resembles anyone known to IR Editors.

A RESEARCH project on time-temperature tolerance of frozen foods now in progress in the Western Utilization Research Branch of the U.S. Dept. of Agriculture has developed some findings of value to the food industries. These show how much faster changes in quality take place at 10, 20 and at 30 F than at 0 F, and that products change at differing rates under the same conditions. An interim report, starting on page 17 covers results of the study on frozen fruits, vegetables, and poultry.

AUEROMYCIN when used as an ice additive for fresh fish, it has been considered, is rapidly destroyed when the fish is cooked. But in a paper presented at an international meeting of fish processing technologists, this question is raised again and some doubt is expressed as to whether the methods used in evaluating the results of the cooking test are sufficiently thorough and accurate. See review of subject, page 19.

THE FREEZING and cold storage of fresh fish is the subject of a study conducted by the Fish and Wildlife Service of The Department of Interior. Changes, it was found, are produced, not by the freezing process but by the subsequent cold storage. One essential to a quality product, it was found, is to keep the temperature of the frozen fish as low as possible. Another important factor is a protective covering or coating. A review of results of the study is given in the article on page 21.

ICE SALES in 1955 amounted to 28,117,124 tons, a decline of 6.85 percent from 1954, according to an annual survey conducted by the National Association of Ice Industries. Dollar sales also declined 3.85 percent from 1954 to $235,705,803. Two classifications showed increases. Ice cube sales totaled 809,149 tons, an increase of 8.24 percent; and automatic vending outlets increased from 7,615 to 8,727, 14 percent over the number in operation in 1954. Other details are given in summary of the report on page 25.

TEMPERATURE Control in the manufacture and distribution of candy, bakery goods, and ice cream contributes much to the quality of the product. The Fred Sanders Corporation in Detroit, which operates a manufacturing plant and more than five dozen retail stores, utilizes 675 tons of refrigeration in the manufacture and distribution of 20 million pounds of candy and over 900,000 gallons of ice cream annually. A tour of this plant will be a feature attraction of the 47th annual NAPRE convention as described in article page 32.

CONTINUING its intention of bringing helpful operating and maintenance articles, to its members, NAPRE's Educational Committee this month presents "Sound Maintenance for Reciprocating Compressors", starting on page 27. This is the third article of six in the theme of "Prevention of Refrigerating Plant Failures." Prompting of this series was criticism leveled at the practical engineer in two Industrial Refrigeration articles earlier in the year. Blame for 265 plant failures in 500 surveyed was laid at the door of the operator in those articles.

GUEST ROOMS of the Dyckman Hotel, Minneapolis are being air conditioned as part of a continuing program of remodeling. A small steel building on the third floor roof contains the machinery. For details of the equipment and installation see article on page 23.

SELLING information for use of refrigerated space salesmen issued by The Refrigeration Research Foundation in the August issue is continued in article on page 22 on refrigerated storage of tree nuts. Storage, it is pointed out, lengthens the life of this product and helps preserve quality.

DAMAGED GOODS is one of the outstanding problems which will always be with the warehousing industry, and prompt disposition will build for the warehousemen valuable customer relations. How one concern met and solved this problem is told in the article on page 24.

FROZEN FISH is rapidly gaining in popularity in Sweden. From a very small beginning six or seven years ago, the consumption for 1956 is expected to be close to 9,000 tons and within the next five or six years to reach a total of between 20,000 and 25,000 tons. Cod, whiting, and haddock are the most popular.

FOAMGLAS®

the cellular, stay-dry insulation

Workmen are installing lightweight, dimensionally stable blocks of 4" FOAMGLAS in T-iron ceiling of new Welch Grape Juice freezer. Free-standing walls of FOAMGLAS—which help support the ceiling—require no extra structural support because of the insulation's unusual strength and rigidity.

Welch Grape Juice saves 10% on cold room construction by insulating with strong, stay-dry FOAMGLAS

The Welch Grape Juice Company found a new money-saving technique to build freezers and coolers at plants in Brocton and Westfield, N.Y. FOAMGLAS with its unique combination of structural strength and constant insulating effectiveness, made this new technique practical.

According to Welch: "We saved valuable time and at least 10% on construction costs with our new type of low temperature enclosure for freezing and storing grape juice concentrates. Key to the design was our use of FOAMGLAS as both structural wall and insulation."

Each of the new Welch cold rooms is surrounded by an insulating envelope of FOAMGLAS. It's used in all walls without support from building structural members . . . in free-standing partitions . . . in pan and T-iron ceilings . . . and under all wearing floors. Moisture-proof FOAMGLAS is dimensionally stable, rigid and takes compressive loads of seven tons per square foot without crushing. Thus, it enabled Welch to eliminate the cost of masonry back-up or supporting studs. And separate vapor barriers were unnecessary.

This completely inorganic cellular glass material provides virtually permanent insulating effectiveness, too. As Welch concludes, "Since FOAMGLAS is moisture-proof, its efficiency doesn't fade. That keeps down the load on our refrigeration equipment. Operating costs are held at a constant low level. In fact, our refrigerating requirements for these cold rooms should be no higher in ten years than they are today."

See for yourself how *you* can benefit when you insulate with FOAMGLAS. Send today for a free sample and directions for six easy tests to perform in your own office. You'll prove that FOAMGLAS is *your* ideal insulation! Write . . .

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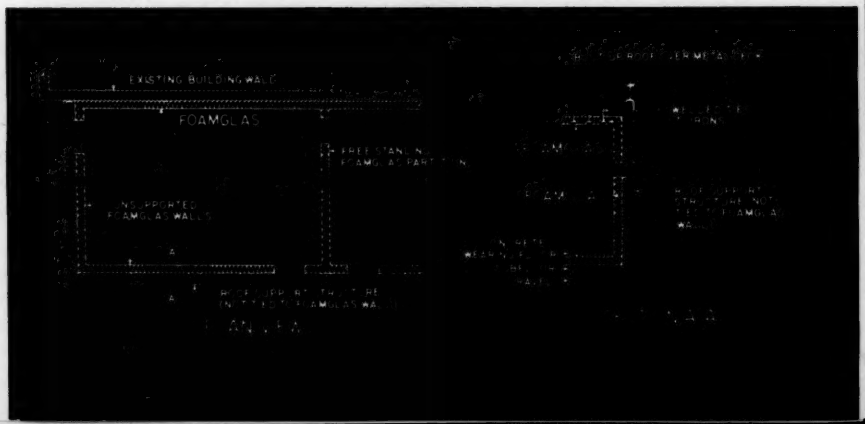
Also manufacturers of PC Glass Blocks



Detail showing use of FOAMGLAS in walls, free-standing partitions, ceiling and floor of new Welch Grape Juice freezer. Note section showing how FOAMGLAS stands free of structural supports for roof.

Is the Water Vapor Absorption System a "Cure-all"?

Discussion by Practical Engineers Questions Economies of Certain Applications

PERPLEXED, troubled, and a bit smoldering in temperament, Kelly P. Danahy, chief engineer, picked up the trade publications he had gathered from his desk, his assistant's, the bookcase and file cabinet in the Metropolitan Brewing Co. Engineer's Office, and stuffed them into an already overworked briefcase. Danahy was the secretary of the Edwards City Chapter, NAPRE, and as was his custom on 2nd and 4th Tuesdays, he was preparing a couple of questions for his engineer buddies to answer in the Chapter Question Box Session. However, the question he was planning to pop tonight was more in the nature of a study project, and that was bad with the already overworked Chapter calendar.

Absorption Suggestion Steams-Up the Chief

Cause of the Chief's perplexity was his own lack of familiarity with some equipment highlighted in the new equipment columns of the trade publications which he had packed up for the meeting. He was further troubled by the fact that the head of the purchasing department, the brewmaster and company president treated him to a nice lunch but had spoiled his dreams of fraternizing by an inquiry as to the application of a water vapor type absorption unit to his own refrigerating plant.

There might be something to the buyer's sugestion of a small unit for air conditioning the management and plant offices as there was adequate steam supply at present. But what really had Danahy doing the slow burn was the smug suggestion from the brewmaster that he could avoid winter power peaks by using such a refrigerating system which would utilize available boiler horsepower instead of the electrical horsepower which drove his heavy reciprocating machines.

Although the brewer was a nice guy, and Danahy had to admit too that no one else seemed to possess the same art for concocting a quality, tasty, thirst-quenching beverage as their own, he had the knack for looking down his nose at the finest efforts of the engineers. What made matters worse, he influenced the front office as much with his engineering advice as did Danahy.

"Greetin's, Scotty, 'lo Jack," was Kelly's greeting to the two acquaintances comfortably seated in Metropolitan's Stein Hall.

"See Metropolitan has already bought you a drink," he commented before his two friends could acknowledge his salutation.

Jack, who was John P. Turner, chief engineer of the city's leading hotel, nodded his greeting while he continued to gaze through the contents of the glass in the reasonably well-lit hall.

Firm Vends Both Systems

"Good day to you, you Irishman, what is up tonight?" came from the party addressed as Scotty, one Ramsey A. McDonald, sales engineer for the Metropolitan branch of a leading refrigeration equipment manufacturer. Scotty had provided practically all compressing units in the Metropolitan plant and had assisted the chief in most of his engineering design and applications in the brewery. It was Scotty's firm which was getting the play in the trade publications on the absorption units which had set off Kelly Danahy's dilemma.

Kelly had made a quick phone call to his friend Scotty following his digestion up-setting luncheon and suggested that Scotty bring Jack over for a bit of refreshment before dinner and the meeting which followed. He hadn't mentioned to Scotty the front office's interest in the newly publicized line, as he felt that would be giving his friend an edge over himself should they later enter into any negotiations for a unit.

"In a recent edition of INDUSTRIAL REFRIGERATION," The Irish Chief stated, "I noticed a package absorption unit. It looks all right but, has NAPRE ever published any information on the operation and maintenance of an absorption unit? Many of us are not familiar with the practical expense and operation of engines, turbines, boilers and auxiliaries. Now your company has to add more confusion by telling everyone how the absorption unit is going to replace the compression refrigeration system. This absorption type of refrigeration is more than a little bit hazy to many of us. We should be familiar with the practical problems and expenses of operating steam equipment before we shoot our wad and make a glory box out of an absorption system.

"Hold on, hold on," interrupted Scotty, "I didn't do it but I can't say that I disapprove. These units have their place and they are doing a good job. Personally, I have installed quite a number including the two machines in Jack's plant."

"I know," said Danahy, "I hope that Jack can give me the low-down on them" (betraying the very reason that he had asked Scotty to bring Jack along). Scotty's interruption hadn't put the brakes on him a bit, he continued:

"Isn't the heart of an absorption system its steam supply; therefore, shouldn't we be concerned over the source of the steam supply? Isn't it true that an absorption system also works efficiently at full load but troubles occur at reduced loads?

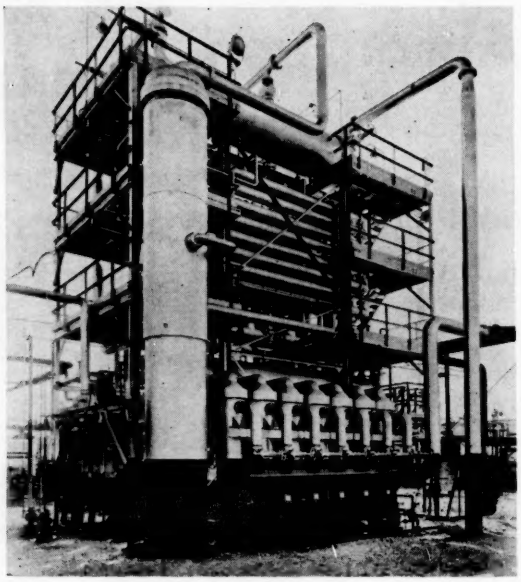
"Therefore, shouldn't the buyer of the systems be concerned about the fluctuations of the design load?"

Vapor Unit Slow Starting

Not giving Scotty a chance to answer his questions the Chief raced on —

"Basically an absorption system is a descendant of the old steam jet cooling system; we must remember this. When we speak of the steam jet cooling system we remember that it works on the principle of evaporating water in a vacuum. We also must remember that the operation of such a system is a bit sluggish and therefore not adaptable to rapidly changing loads."

"Ho, it looks as if somebody is trying to sell you an absorption plant, my Irish friend" interrupted Scotty. "Come on now, give me the rest of your objections and then let me buy you and Jack dinner while I bring



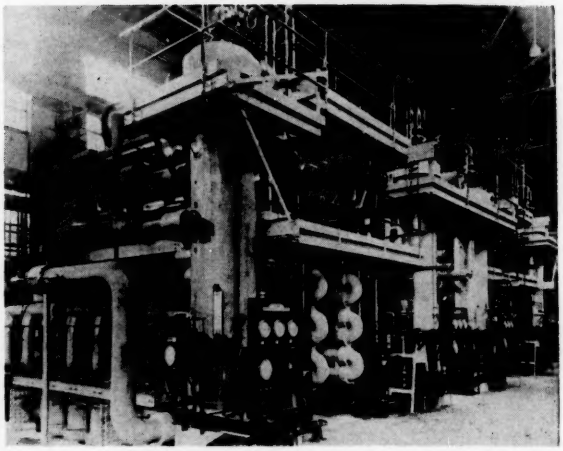


Fig. 1 — (left) NH_3 absorption refrigerating system of 700 tons which the story's hero, Kelly Danahy, helped install in 1940.

Fig. 2 — (Above) Chemical plant, 1400 ton NH_3 absorption system on which the hero spent two years "teaching" plant engineers.

you up to date on improvements our company has put into these systems."

Neither being men to pass up a dinner offer, the two chiefs quickly finished their pre-meal refreshments and hustled down to the Men's Grill near the NAPRE meeting hall.

However Kelly Danahy just had to get his criticism off his chest. Therefore, the conversation enroute and at dinner was monopolized by the Metropolitan Chief. His briefcase seemed to be an endless source of books and pamphlets on the subject.

"Now here is the kind of absorption system that I know all about," said the Irishman, producing photographs and literature of an ammonia absorption system in a refinery and a chemical plant (Figs 1 and 2).

"That's right," commented Scotty "you did have a number of years experience with that kind of equipment when you were in the erecting game for our competitor."

"Yes," said Danahy, "I stayed on with that refinery and showed them how to operate that 700 ton plant. Then when those chemical company operators thought that 1400 ton plant with those four units over across the river was a big mystery, I got myself a couple years time there showing how it was done."

"Never operated anything that big," commented Jack. "Always seemed easier to earn a living indoors," which comment gave a clue to Turner's character.

"Now this new fangled machine of yours," continued Danahy, pointing to the literature which he had acquired from his assistant (his assistant had a mania for writing for all catalogues, books, etc., offered in all publications) "In order to maintain a low back pressure (assuming no leaks), a highly concentrated solution of some salt (such as lithium bromide) is used, which is sprayed into a tank to absorb the water vapor from the sprayed water. This absorption and spraying takes place in the tank which is under a vacuum. The water that is absorbed in a concentrated salt solution is later boiled off with steam or direct heat, am I right?"

"In general, that is the idea," came from Scotty.

"Well, when this equipment operates at low capacity, that salt solution coming to the tank for concentration could become over concentrated, and crystals then deposit on the inside of the piping," said Danahy in a sort of half question, but not pausing long enough to give Scotty a word in edgewise.

Precipitates Shut Down

"When this happens, a shutdown would probably be required which would result in the loss of refrigeration or cooling. No one that manufactures this type of equipment has proof that this will not happen or does not happen, do they?

"That might have happened with earlier models, but improvement —" Scotty started to say—

Ignoring his friend completely the Chief continued in regard to maintenance cost, etc. "I cannot say anything, but I do know that with all the pumps required it is a fact that maintenance is not negligible."

Whipping out another document he had commandeered from his assistant, Danahy quoted "A survey made by a Philadelphia Electric Co. in reporting at a meeting of the National District Steam Heating Association, shows the starting time for these machines to be 50 to 100 percent longer than an electric system. If a boiler is used to supply the steam it will require approximately 1 to 1½ hours to bring the boiler up to pressure and get the system in operation each morning or each time cooling is required."

"Wow," exclaimed Jack, getting in his first bit of conversation since dinner started, "you must have spent all day looking into these systems."

Danahy Continues

Although he glanced in Jack's direction, Danahy ignored the comment and continued "I think the absorption system also requires more condensing-water than the cooling tower electric driven machine. Nearest I can figure, it would take three gallons per minute per ton for the electric drive and four gallons per minute per ton for the absorption system along with the increased cooling tower size for the absorption system.

"But, also I figure 18.5 pounds of steam per hour per ton of refrigeration. Add an additional 3½ pounds of steam per hour per ton of refrigeration for a steam ejector which the unit must use, since the steam ejector is used to create the vacuum in the evaporator. On some of the days during the earlier air conditioning season and some of the days during the Fall air conditioning season, conditioning is only required for 1 or 2 hours per day."

"Well" . . McDonald started, not knowing which question of the Chief's to answer first.

"Just a minute," came from the Chief. "Two words and I am finished. Now if we calculate the energy input to an absorption system we will come up with over 22,000 Btu's per hour per ton of refrigeration. If someone wanted a cooling system in their building who was not an industrial user of electric current they could do much better by using the natural gas driven reciprocating engine to drive a refrigerating compressor directly rather than using the natural gas to heat a medium for an absorption system. I mentioned an industrial user of an electric current because they might stand to gain something from using the electric drive in that a synchronous motor could be used with power factor correction and in that way prove very satisfactory.

"If you were just to take the common standard figure for a natural gas engine of 10 cu. ft. of natural gas per horsepower per hour, we would come up with an energy input in the vicinity of 10,000 Btu's per hp per hour. Then if we base the hp demand on 1 hp per ton of refrigeration we would come up with the figure of 10,000 Btu per hour per ton of refrigeration which is less than half of the energy requirement of the absorption system. Of course we would have to figure some cost for maintenance of the natural gas engine but according to information from the best informed friends of mine, I believe that this is not going to bring the total cost up to more than half of the absorption system operating and maintenance cost.

Resents Incomplete Story

"The reason I would like to call attention to the absorption system is that I just don't want to see people taken in by a story that is not as complete as it should be and looks rosier than it actually is. To me an absorption system is good only in an application where the load is constant and you have steam available such as process steam in an oil refinery or some similar application. In an oil refinery once the load is started it maintains a constant requirement and, therefore, is very suitable to an absorption type system. If we refer to the comfort conditioning of a building, the load is anywheres but constant. And, when we have a human comfort load on an absorption system and we operate at reduced capacity we are doing so in an inefficient way as compared to the natural gas engine drive or an electric motor drive."

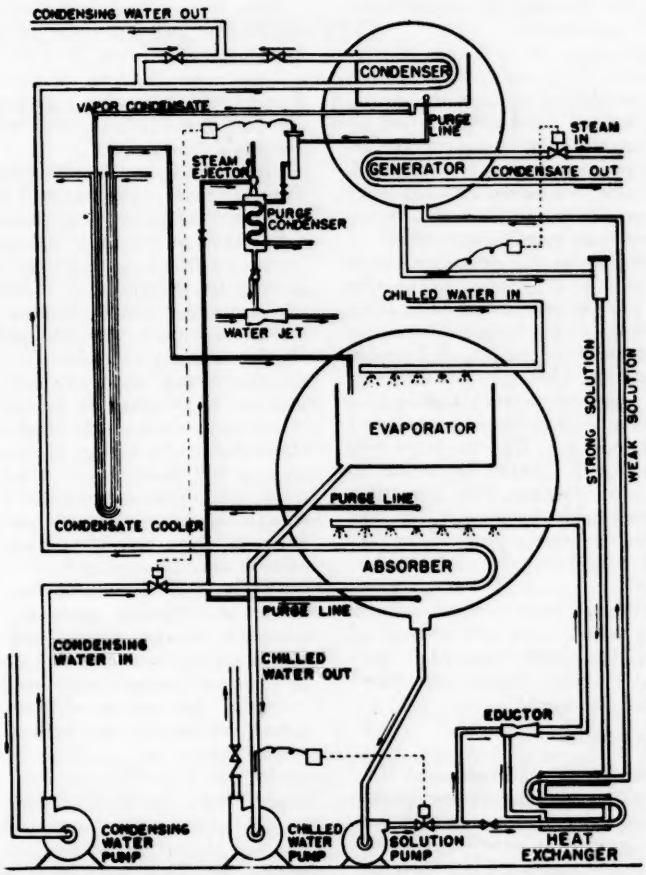


Fig. 3. Diagrammatic layout of pre-1956 water vapor absorption plant utilizing Lithium Bromide salt solution as absorbent. Danahy mixes this plant up in his mind with the NH_3 plant principles.

"Finished?" asked Scotty, getting an affirmative nod from Kelly who was fast catching up on his dinner. Scotty began his replies, being at the disadvantage of trying to recall the Chief's questions and statements from memory.

"In the first place the only relationship between an absorption machine using lithium bromide as an absorbent, and the old steam jet machine, is the fact that both are steam. That is perhaps true of NH_3 units too. It is true that the original vapor absorption machines had a steam jet which was simply used as a purge to pull the vacuum on the machines. There is another relationship there; that is, both use water as a refrigerant, requiring no chemical refrigerant.

"Other than that, the operation and the performance (both operating and maintenance-wise) vary differently for the true steam jet versus absorption machines. The jet in the water vapor absorption machine referred to, was a very small one used to pull the initial vacuum and, of course, is not used in our modern day machines. It is rather interesting that the machine in the article to which you refer does not have a steam jet at all.

"Your figures or calculations indicate that the steam jets on the absorption machine required 3½ lbs. per hr. per ton. I cannot imagine where your figure came from.

"On those machines that we did use the steam jet as a purge, the purge jet used only a maximum of 10 lbs. of steam per jet, per hour, up to 335 tons capacity. On the larger machines two jets were involved requiring 20 lbs. of steam per hr. per machine, regardless of size.

"In the case of the old steam jet machine, the jet was also used to remove the water vapor and had to work at full capacity in order to be efficient. This fact did not permit good partial load operation unless individual jets were cut in and out. The net result was that good efficiency was not obtained at partial loads."

Signaling the waiter for another

dessert for Danahy, MacDonald continued opportunely.

"The water vapor in the absorption machine is removed by the lithium bromide salt solution. As the capacity of the machine is varied by the density of the absorbent, the reaction to load changes is very rapid, practically instantaneous and very directly with the load changes occuring in the air conditioning cycle.

"Now, about salt solidification or 'freeze-up', it is true that in the very early models of the machines there was some trouble in solidification or crystallization of the lithium bromide salt solution. However, this difficulty was practically eliminated in a change of control that occurred over 6 or 7 years ago. With the latter type controls it is almost impossible to solidify the solution. This is particularly true with the present day (the so-called automatic push button absorption machine). How about that, Jack?"

"We have never experienced any trouble at all since our method of control has been changed," commented Turner. "This testimonial pays for my dinner".

Crystallization

"You may recall," continued MacDonald, "we did have some trouble from solidification on the first machine installed at your hotel," looking at Jack, "but that this trouble has not occurred since the change in control was made," turning to Kelly.

"Insofar as vacuum tightness is concerned, this is not a problem. Centrifugal machines also have to operate under vacuum and be made vacuum tight. The original machine shown in that booklet of yours (Fig. 3) was what we called open type and the difficulty that was encountered in maintaining vacuum in the early days, was primarily in the chilled water piping circuits. I am perfectly sure that Jack's records at the Hotel will show no trouble from this point.

"As a matter of interest, all our new type machines have what is called a closed circuit, wherein the chilled water circuit passes through a coil on the inside of the absorber. This piping circuit is not concerned with maintaining any vacuum; therefore, is not subject to the variations and skill that may be obtainable on the part of mechanics and operators in locations throughout the country.

" I am sure that the time spent in maintenance at the Hotel is no greater on the absorption plants than it is on the centrifugal units which Jack has. His records will be of greater value than my judgment in this respect."

Even less in time and material", said Turner, and looking at his watch hopefully, "time to go, We'll be late."

This time it was Scotty who ignored the hope for interruption. He had been looking over one of Danahy's "documents".

"In regard to the Philadelphia Electric report to the National Steam Heating Association," he continued, "the statement was made that, assuming a centrifugal starting time is 100 percent, the average of 11 absorption plants studied would indicate that the average time was 235 percent. Of the most typical, which is 8 out 11, the average time was only 148 percent. Here again of course, this report was written on the older vapor absorption machine. But 148 percent or even 200 percent may sound like a lot, unless you could assume a centrifugal machine start up time is 5 minutes; then this absorption machine is only 10 minutes."

"Yeah, but how about the time consumed in getting steam up," interrupted Danahy, with a look that spelled getting into the discussion.

"Let's go," came again from Jack.

"As to the amount of time consumed in starting up boilers and getting steam on the line, etc., I would not know the answer, continued Scotty, but would assume that no one would simply use a boiler operated absorption machine for ten hours a day. Most applications where an absorption machine has been used, has been because the steam system was already in use for other reasons."

Catching a second wind, he went on.

Diagram on Water Use

"Regarding the amount of condenser water used for an absorption machine: this can be more nearly averaged 3½ gallons per ton of refrigeration with condensing water at 85 F. If water is lower in temperature, correspondingly less water is used. Your figures, Chief, infer that 4 gpm *was* required, which is 15 percent too great.

"With regard to power factor correction, your comments on this are very much to the point and if power factor correction was of prime importance, it is quite possible that an electric machine would be used in any event. On the other hand, it is quite possible to obtain power factor correction by the use of static condensers and at a more economical cost. I have no personal knowledge of the use of natural gas in reciprocating engines, so can make no comments. Let's go."

(To be continued in October)

Cold Storage Studies on Nursery Stock—Rose Plants

SOME preliminary work conducted by USDA men, A. L. Ryall, J. M. Harvey and M. Uota in California, has been done on storage of bare-root roses in polyethylene-line packages with some apparent advantage. Plants held in atmosphere high in CO_2 and low in O_2 broke and bloomed earlier than those held in ordinary storage atmosphere. This work will be enlarged to cover all phases of packaging and storage of nursery stock, including promising new fungicides. Grey-mold fungus, for example, can develop in high-humidity atmospheres, even at low storage temperatures and will require control. The Foundation assists these investigations with a grant-in-aid and has also initiated research on other nursery products at the University of Rhode Island, under supervision of Dr. E. P. Christopher, Head of the Dept. of Horticulture. —TRRF Information Bulletin.

Libby Warehouse Addition

IMMEDIATE construction is planned of a 100 × 180-foot addition to the cold storage warehouse of Libby, McNeill & Libby in Walla Walla, Wash., it was announced by Erroll Downing, plant superintendent. Bids were asked from contractors for this construction by August 1.

The addition will extend 180 feet to the south and 100 feet west of the present freezer building which is located in the southwest corner of the sprawling Libby development. Success of the present processing season is believed one of the cogent reasons for officials of the Libby organization deciding to enlarge its cold storage facilities.

Better Handling Standards For Frozen Foods

AT a recent Super Market Institute seminar session, Massachusetts Institute of Technology scientists recommended better handling standards for frozen food in supermarkets and stressed the importance of packaging. "Primary function of the package," said the scientists, "is product protection". Recommended qualities for packaging, according to Dr. Marcus Karel are, "low permeability to water vapor, oxygen, fats and oils, resistance to acids, tight seals, flexibility of package unaffected by low temperatures." NARW Cold Facts.

Research Conference Reports on
Temperature Tolerance of Frozen Foods

REPRESENTATIVES of 25 industrial and government organizations met in Albany, Calif., July 30 to August 1, to discuss results of the comprehensive project on time-temperature tolerance of frozen foods that is now well along in the Western Utilization Research Branch of the U. S. Department of Agriculture.

The purpose, explained by M. J. Copley, Chief of the Branch, was to counsel with representatives selected by interested organizations on ways and means of achieving maximum usefulness of the results. No information from the project has been published at present, he said, but the research staff will begin to publish a series of technical reports soon.

"The overall effect of the project," Dr. Copley said, "will be to provide information needed in the commercial handling of frozen foods from producer to consumer. Since an increasing number of people are handling frozen foods, there is need for very extensive use of the results of the project. Commercial organizations concerned with stages in frozen food handling and with manufacture have requested this large investigation and have contributed assistance in many ways. Now they are as interested as we are in effective use of the results." He also stressed the need for avoidance of hasty and inaccurate generalizations and the fact that the results will be useful only when fully understood.

W. B. Van Arsdel, Assistant Chief of the Western Branch, told the group that the project was initiated in 1948. Testing rooms were constructed and now some 50,000 commercial samples have been used from packers in various parts of the country. Patterns of exposure to temperatures have included moderate and extreme conditions. Testing of samples began in 1950. Now some products have been studied during two and three seasons.

Results were presented by research workers on five fruits, four vegetables, and several types of poultry products. Studies on peaches and strawberries have covered the years 1950-54 and over 50 lots (about 10,000 packages of each fruit) have been required. About 2,000 packages of red sour pitted cherries, 4,000 of raspberries, 10,000 6-ounce cans of concentrated orange juice, 6,000 packages of peas, and 9,000 of green beans have been used. Less work has been done on cauliflower and spinach thus far. Work on vegetables was begun in 1952. Studies on poultry products are in progress; results on uncooked turkeys, broilers, and stewing hens and on certain types of precooked poultry products were presented.

These results as reported by the staff establish for each frozen food just how much faster changes in quality take place at 10, 20, and 30 than at 0 F. The reports showed that products change at differing rates under the same conditions. Partial damage, no matter how slightly detectable, was found to be cumulative on repetition and never reversed by reduction of temperature. Geographical variations were found to be small. Within limits, certain changes in processing (including packaging) have been found capable of strengthening frozen foods against temperature hazards.

Frozen Fruits

Results on frozen peaches were presented by E. F. Jansen, on strawberries and red sour pitted cherries by D. G. Guadagni, on raspberries by C. C. Nimmo, and on frozen concentrated orange juice by R. J. McColloch. Work on the latter product was done at the Pasadena laboratory of the Western Branch.

Studies on peaches and strawberries covered the years 1950-54, and 50 lots from major producing areas (representing about 10,000 packages of each fruit) have been obtained from packers. These reports (like all reports during the conference) dealt with retailed quantitative measures of changes in product as related to temperature sequences. The report on peaches showed the special importance of atmospheric oxygen in headspace as a cause of browning, the close relationship of headspace and nonhermetic package to browning rate and to rate of loss of added ascorbic acid, and also the influence of less important factors. Among fruits, peaches rank high in sensitivity to temperatures above 0 F. In the general run of packs in composite containers, only a few days at 25 F produced serious browning, whereas only a few weeks were required for the same change at 10 F. At 0 F (effectively maintained or with only slight fluctuation above and below) color was held for more than a year.

Strawberries, according to Mr. Guadagni, lost color, flavor, and ascorbic acid at about the same rates, which increased rapidly as temperatures rose beyond 10 F. That is, the rate increased two to three times for each 5-degree rise in temperature. As compared with peaches, strawberries are slightly more stable, largely because browning in peaches is readily apparent. As with peaches, however, quality was retained much better at elevated temperatures in hermetic than in nonhermetic containers.

About 2,000 packages of red sour pitted cherries, from two producing areas, were used. As with peaches, browning due to atmospheric oxygen was an important result of exposure to temperatures above 0 F, according to Mr. Guadagni. Another readily apparent change was an increase in firmness of cherries, which is less important than color but indicates extent of experience above 0 F. At 20 F, cherries held three to four weeks made good pies and even after somewhat longer periods the pies were considered satisfactory.

About 4,000 packages of raspberries were obtained from a large producing area, according to Dr. Nimmo. In general, frozen raspberries are more stable than peaches or strawberries. Ratio of color in fruit to color in sirup indicates temperature experience, since rate of movement of color from berries to sirup is faster as temperature increases. As with strawberries, rate of loss of ascorbic acid increased with increasing temperature.

The studies of frozen concentrated orange juice, reported by Dr. McColloch, involved about 10,000 6-ounce cans representing nine packs of California product obtained during the years 1950 to 1955. Four of the nine lots had been mildly heat-treated during manufacture to increase cloud stability. Loss of cloud was found to be the first undesirable change in quality brought about by unfavorable temperatures. Flavor was comparatively more stable than cloud and vitamin C was found to be more stable than either cloud or flavor. Thawed orange concentrates became unpalatable before as much as 10 percent of the vitamin C was lost.

Accumulation of small degrees of temperature damage, which singly did not cause detectable change, ultimately resulted in change in flavor. The longer some samples were held at 0 F, the shorter was the period they could be held at 40 F without cloud loss.

Frozen Vegetables

Experimental procedures and data on frozen green beans were presented by W. F. Talburt, on cauliflower and spinach by M. M. Boggs, and on peas by R. L. Olson. Ten lots of green beans, representing 4 varieties from four major areas, were used during the 1952-55 seasons. The 9,000 commercial retail packages were obtained from processing plants. The data Mr. Talburt presented showed that the effect of processing on initial color was greater than the effect of geographic origin or variety. He used graphs to illustrate progressive chemical deterioration in chlorophyll and loss of ascorbic acid in samples during storage at 0 to 30 F. Color and flavor changes noted by trained judges were found to be correlated with chemical changes. Averages of four lots showed that flavor changes were detectable within about a month at 20 F as compared to slightly more than a year at 0 F.

Experiments on cauliflower and spinach were started with 500 retail packages of each in 1955 and will continue for several seasons. Miss Boggs discussed the effect of storage temperatures above 0 F on the development of brown discoloration and off-flavor, along with a decrease in ascorbic acid. In spinach at 10 F and above there was considerable color deterioration, as measured by loss of chlorophyll, within several months. Flavor appeared to be more stable in spinach than in cauliflower. More package-to-package variation was found in these products than in peas and green beans.

Results on six lots of peas of four varieties, obtained from three major producing areas during the 1952-55 seasons, were discussed by Mr. Olson. Differences among varieties were greater than among geographic areas. About 6,600 10-ounce retail packages have been used to study the effect of 20 different time-temperature conditions ranging from minus 30 to 40 F and from one day to 12 months. Color and flavor changes ranked by trained judges were found to be correlated with the changes in chlorophyll and ascorbic acid. The first dectectable flavor change occurred in about a month at 20 F and nearly a year at 0 F; color changes were noted within two and three weeks at 20 F and a half-year at 0 F. Mr. Olson said the data indicate that spinach is more stable than peas or green beans. Loss of color occurs in beans faster than in peas. Cauliflower turns brown and becomes objectionable in color in about the same periods as green beans.

Frozen Poultry

Studies on commercial types of frozen raw poultry, reported by A. A. Klose, have established the generally good to excellent quality that can be expected from present commercial products that are processed, packaged, and stored in accordance with best practices. Time-temperature-tolerance tests on poultry are incomplete, but considerable data have accumulated on ready-to-cook roaster turkeys and fryer turkeys and packaged cut-up chicken broilers and stewing hens. Measurements were made of rancidity and surface dehydration, which are generally recognized as the two most critical factors. While turkeys have a shorter storage life than chickens under comparable conditions because of their less-stable fat, nevertheless ready-to-cook turkeys packaged in a relatively moisture-impermeable material and held at 0 F or below developed only minor losses of quality in a year, which is somewhat longer than normal commercial requirements. Fluctuations in product temperature below 20 F in general do not cause much, if any, more deterioration than a steady temperature equal to the average of the fluctuations.

Cut-up Chicken Fryers Retain Quality

Well packaged cut-up chicken fryers have been found to retain their quality for a year at temperatures of 0 F or below. With less protective packaging, detectable changes appear much sooner. Stewing chickens, which contain much more exposed depot fat than the fryers, develop detectable rancidity sooner. At temperatures of 10 to 20 F, significant off-flavor developed within three months in stewing hens or in inadequately packaged frying chickens.

Surface dehydration, with loss of fresh frozen appearance, increases with increase in storage temperature, but with the adequate moisture-vapor-proof wraps now available dehydration should not be a problem. However, because of the possibility of improper packaging and rough handling in storage, distribution and merchandising, quality deterioration at temperatures below 10 F may as likely occur from package failure as from excessive times and temperatures.

The flavor stability of frozen turkey dinners, turkey pies, and fried chicken has been studied at temperatures from minus 30 F to 20 F, Helen L. Hanson reported. Some of the samples were commercial products; some were prepared in the laboratory. Significant rancidity developed in products held 1-½ to two months at 20 F. At 10 F, fried chicken developed a rancid flavor in three months. The turkey products at 10 F and below lost some of the flavor of freshly cooked turkey during storage, but the changes took place slowly. After a year at 10 F, the flavor of these products was not appreciably different from those stored at minus 10 F. This unexpected flavor stability at 10 F is at least partially due to the common practice of discarding turkey fat rendered during cooking in preparing the products for freezing. At 0 F, the fried chicken developed stale or rancid flavors after six months, but flavor changes in turkey dinners and pies were slight. There was no detectable difference in flavor of turkey dinners and pies held at fluctuating temperatures and those held at constant temperatures midway between the extremes.

With foods such as chicken a la king, which contain sauces or gravies, and with custards and puddings containing thickening agents, fluctuation in the range of minus 10 to 10 F was definitely more damaging than the constant midpoint temperature. The primary undesirable change is the curdled appearance and liquid separation when samples are thawed. These changes can be prevented in sauces and gravies for a year at constant 0 F by the use of waxy rice flour, and they can be prevented for several months in the custard and puddings. When these products were stored at 10 F however, changes occurred within a few weeks. Fluctuating temperature from minus 10 to 10 F resulted in changes in much shorter periods than at zero. Stability above zero was improved, however, by the use of certain additives and, in some cases, by variation in proportion of ingredients.

General Foods Buys Plant

THE CITRUS Juice Concentrating plant of Florence Foods, Inc., at Winter Haven, Fla., has been purchased by General Foods Corporation for $1,800,000. The Birdseye Division of General Foods took over the plant June 30, according to Fred Jotterbein, vice-president and general manager of the Birdseye division.

Aureomycin as an Ice Additive for Fresh Fish

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EVER since 1948, when Tarr and Dear published the first investigations on the effect of antibiotics on the bacterial decomposition of fish flesh, the fishing industry has taken an increasing interest in the utilization of these agents. A great number of antibiotics have been tested and many experiments have been carried out for the purpose of finding the best method of utilizing them. Ice additives were well known long before the discovery of antibioticsm but antibiotics have turned out to be the most effective additive ever known.

It seems sufficiently demonstrated that aureomycin and terramycin are the only antibiotics which can be used advantageously in food technology. These antibiotics have proved to have a stronger effect than any other antibiotic on the processes of putrefaction and, at the same time, they are rapidly destroyed during cooking, which is of great importance to the consumer. It cannot be emphasized strongly enough that for reasons of public health, it is imperative that there should be no amount of antibiotics injurious to health in the product when it is ready for consumption. If this requirement is not met, it will be absolutely impossible to obtain permission to use antibiotics in the manufacture of foods and it is, therefore, waste of time and energy to try to determine the effect of these agents, however great this effect may be. Aureomycin and terramycin are antibiotics with a wide spectrum and as they are rapidly destroyed during cooking, the greatest interest has been attached to these antibiotics.

Use of Antibiotics

Antibiotics may be used in the fishing industry in three different ways, viz:

(1) as ice additives
(2) as spray treatment
(3) as dip treatment.

Concentrations of antibiotics from 1 to 10 microgram per gram of ice (1 to 10 parts antibiotics to 1 million parts ice) are generally examined. Good results have been obtained with aureomycin in a concentration of 2 to 5 parts per million in the U.S.A. and Canada as well as in Europe. Most experiments, however, have been made under different conditions and it is no wonder, therefore, that the enhancing effect of aureomycin on the keeping quality of fish has differed widely from experiment to experiment.

In this connection it should be borne in mind that aureomycin as ice additive acts as a bacteriostatic agent, and even if aureomycin has a wide antibacterial spectrum its effect will depend, to a certain extent, on the composition of the bacterial flora. Indirectly, differences in storage temperatures are of great importance as not all bacteria grow equally well at all temperatures. Differences in storage temperatures may, therefore, cause qualitative changes in the bacterial flora, which further complicates the picture. Although the results of the experiments cannot be expected to give any clear answer as to how long fish will keep in practice when treated with ice with aureomycin added, everybody seems to agree that this ice additive has a very great effect on the keeping quality of fish.

Results in Denmark

In Denmark we have carried out experiments on the icing of small cod and plaice with ice containing aureomycin. The so-called "Ice Mix" was used in the experiments with cod in a concentration of 2 parts of aureomycin to 1 million parts of ice. The "Ice Mix" is a crude aureomycin preparation which was kindly placed at our disposal by the American Cyanamid Company. The cod used for the experiments were live cod, iced immediately after slaughtering. Icing took place in wooden boxes in a refrigerator at an ambient temperature of 46.4 F. Large quantities of ice with aureomycin added and ordinary ice (as a standard of comparison) were used. In order to follow the spoilage processes, the trimethylamine and total volatile bases were determined during storage and the bacterial growth was followed by means of plate counts. Taste tests were carried out simultaneously by 10 persons.

The development of trimethylamine was slow and showed no difference between the 2 types of ice during the first 10 to 12 days of storage. Towards the 10th/12th day the trimethylamine content increased considerably in the fish iced with ordinary ice and the fish became really bad. This increase in the trimethylamine and volatile bases did not take place in the fish iced with ice containing aureomycin until 3 to 4 days later, i.e. around the 13th/16th day. The chemical tests thus showed that the cod iced with ice containing 2 parts per million aureomycin kept 3 to 5 days longer than cod iced with ordinary ice. The bacterial counts showed no significant difference between the two types of ice for the first 10 to 12 days, although there was a tendency of a somewhat reduced growth of bacteria in the aureomycin iced cod. After 10 to 12 days this tendency was more pronounced and after 14 days there were 10 times as many bacteria in the cod iced with ordinary ice as in the aureomycin iced cod. Thus, also the bacterial investigations showed a preserving effect of the aureomycin additive.

If we take the difference in the time it took the 2 samples to reach the same number of bacteria as a criterion of enhanced keeping quality, the experiment with cod showed a prolonged keeping time of 5 to 6 days due to the aureomycin. The taste tests did not show the preserving effect of aureomycin nearly so distinctly as the chemical and bacteriological investigations, but it was nevertheless found that the fish iced with ice containing aureomycin kept 1 to 2 days longer than the fish iced with ordinary ice. Our tests are quite thorough, however, the fish being judged by appearance, smell, taste, and texture and one average score being calculated for each of the organoleptic properties.

Similar experiments were carried out with plaice, where 5 parts of aureomycin were added to 1 million parts of ice. The plaice were iced immediately after slaughtering. Large quantities of ice were used and the fish were stored in boxes in a refrigerated room where the ambient temperature was 42.8 to 46.4 F. The chemical analyses carried out on plaice during storage did not show as uniform results as was the case with the small cod. Already at the beginning, the content of trimethylamine and total volatile bases was rather high (about 10 to 12 mg per

This study was presented at an international meeting of fish processing technologists organized by the Food and Agricultural Organization of The United National Interim Committee on Fish Handling and Processing, held at Rotterdam, The Netherlands June 25-29, 1956.

100 g fish), and only the content of volatile bases increased considerably during storage. In general, the content of trimethylamine and volatile bases was lower when the fish was iced with ice containing aureomycin than with ordinary ice. However, these analyses were so unreliable that nothing definite can be said about the preserving effect of aureomycin on the basis of the chemical tests.

The effect on the bacterial growth was far more pronounced and more reliable in the experiments with plaice. During storage the aureomycin iced plaice generally showed bacterial counts per gram of flesh 1/10 to 1/100 that of plaice iced with ordinary ice. This corresponds to an increased keeping quality of 3 to 4 days based on the number of bacteria. Also the organoleptic tests showed an increased keeping quality of plaice — but of 2 days only. It should be borne in mind, however, that these tests were carried out on the cooked fish only and cooking undoubtedly eliminates certain differences. It is our impression in general that if organoleptic tests are carried out on raw fish the advantages of aureomycin ice over ordinary ice will be even greater.

These aureomycin experiments have been carried out twice with both cod and plaice and with practically similar results. We are, therefore, convinced that even the most thorough analyses will show a considerably increased keeping time for aureomycin iced fish.

Our experiments with aureomycin ice, however, have not shown nearly as prolonged a keeping quality of cod and plaice as the investigations carried out at the Torry Research Station and by Tarr in Canada. This difference may easily be due only to the different conditions under which the experiments have been carried out. Factors such as temperature, concentration of antibiotic, sort of fish and various ways of recording prolonged keeping time will influence the results.

Experimental Fishing

After the laboratory experiments the next step must be large-scale experimental fishing, where the fish are iced on board immediately after being caught, in order to decide the advantage of aureomycin ice under practical conditions. Such field trials have already been carried out in England — as far as I know, with good results. In Denmark we are now going to start such practical icing experiments with aureomycin ice on board the cutters.

The Danish health authorities are of the opinion that the use of antibiotics as a preservative for foods in general should be avoided. Our point of view, in future experiments, is therefore to find out whether fish can be treated with ice containing aureomycin without the consumer being exposed to biologically active concentrations and to convince the Danish authorities that aureomycin ice is harmless when used in the proper manner. It should be remembered that the permission of the U. S. health authorities to use aureomycin dip for chickens is based on the elimination of any harmful effect of the aureomycin.

Destruction by Heating

Preliminary examinations have already been carried out by for instance Tarr, Bisset and Boyd. They found that the aureomycin in ling cod and coho salmon was readily inactivated by heating. A rough estimate, which I have made of the figures stated in their paper, showed, however, that the half-life of aureomycin was found to be about 7 to 8 minutes during cooking. This does not promise very well for our hopes of a total destruction of the aureomycin by heating. It is true that the fish used by Tarr and Bisset had a higher aureomycin content (5 microgram per gram fish flesh) than ordinary aureomycin treated fish, but even smaller concentrations of aureomycin will hardly be destroyed more rapidly.

It is supposed that the destruction process follows the rules of a unimolecular process which is independent of the concentration and which has been verified by several experiments. If the half-life of aureomycin in fish flesh, as stated by Tarr, Bisset and Boyd, is 7 to 8 minutes it can, therefore, be assumed that only half the aureomycin content will be destroyed during a normal cooking time of 10 minutes, independent of the concentration present in the product. From a public health aspect this is not a satisfactory destruction time.

Theoretically, an aureomycin content of 0.025 parts per 1 million parts of flesh must be considered harmless and it is my impression that the U. S. Food and Drug Administration has based their permission to use aureomycin dip for chickens on this limited concentration. This means that the concentration allowed by the health authorities in the cooked products is 5 to 10 times lower than that which remains in the aureomycin iced fish after a normal cooking time of 10 minutes.

The future destiny of aureomycin as an additive to ice may easily depend only on its being destroyed rapidly enough by heating. I shall, therefore, comment on this question at some length.

Effects of Heating

Unfortunately, the method of analyses used in Denmark does not enable us to measure, with any degree of certainty, lower concentrations than about 0.1 microgram/ml. aqueous solutions. As the aureomycin cannot be measured direct in the fish flesh but has to be extracted first an unavoidable dilution will take place when the residual aureomycin in the fish is estimated. This means that we cannot determine the rate of destruction of the small concentrations of aureomycin in which the health authorities are interested. We can only measure higher concentrations and hope that by extrapolations the destruction can be determined under normal conditions.

We have found that the half-life of aureomycin by boiling in distilled water is about ½ minute, i.e. the aureomycin concentration is diminished by 50 percent every half minute in distilled water at 212 F. If boiling is carried out in buffer solutions, for instance a phosphate buffer solution at pH 6.0, the destruction process is slower, the half-life of aureomycin being about 2 minutes. In fish soup we found practically the same half-life (about 2 minutes) when boiling aureomycin in press juice from cod.

It looks, however, as if the aureomycin is better protected when the fish flesh itself is present. For instance, in fish paste consisting of 1 part fish and 2 parts water which was heated in a water bath, the half-life was found to be 5 to 8 minutes. If this goes for a whole piece of fish too, about one-fourth of the aureomycin originally present in aureomycin iced fish will still be present after a normal cooking time of 10 minutes.

Measurements of the aureomycin content in fish with ice containing aureomycin in a concentration of 5 parts per mill, shows that about 0.25 to 0.5 microgram aureomycin per gram fish flesh are to be expected, and by dip and spray treatments even much greater concentrations. Considering that the standard established by the U.S. Food and Drug Administration is 0.025 microgram aureomycin per gram fish flesh, it is a great question whether the comparatively short cooking time for fish is sufficient to destroy so much

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Freezing and Cold Storage of Fresh Fish

A BULLETIN (Fishery Leaflet 429) has been issued by the Fish & Wildlife Service of the U.S. Dept. of the Interior on the freezing and cold storage of fishery products.

When fish which have been frozen and held in cold storage for an extended period of time are thawed and examined, a number of changes are found to have taken place which differentiate them from unfrozen fish. The flesh of the thawed fish will consist of two phases, the solid flesh plus a fluid known as drip which was not reabsorbed by the flesh after thawing. The texture of the thawed fish will be soft, and additional drip can be expressed by applying a small amount of pressure. The surface may have become desiccated by loss of moisture. The color of the surface may have altered in some way. After cooking, the fish may be found to have acquired an off flavor, or the normal flavor may merely be lacking.

Freezing Changes

These changes from the condition of the original, unfrozen fish are sometimes said to be due to the freezing process. Actually, almost all of such changes are caused, not by the freezing of the fish, but rather by the subsequent cold storage of the frozen product. If fish are rapidly frozen and then immediately thawed and examined, very few changes are noted, and those changes that do occur are of a very minor nature. Such a fish, frozen and then immediately thawed, generally exhibits a very small amount of drip, and the texture of the flesh is usually slightly softer than that of fish that never have been frozen. In case of fish frozen in high velocity air without a protective covering some evidence of surface desiccation would also be present. Properly frozen and immediately thawed fish cannot be distinguished by the average person from fish that never were frozen. Even an expert might be unable to distinguish such fish after they had been cooked.

If only fresh, unspoiled fish are frozen, the resulting product resembles the original, fresh fish more closely than fish preserved in any other way. Any alteration in flavor, color, or texture is primarily due to changes brought about during subsequent cold storage. Especially when inadequate precautions are taken during this storage period, very extensive changes may occur which will result in drastic alteration in quality. Thus the popular concept that frozen fish may be fish of low quality is not due to the freezing process itself. Rather, if such is the case, it is due either to the fish having already been of low quality before it was ever frozen, or to its having been stored improperly or for too long a period of time.

Changes in Cold Storage

One of the most important changes which takes place when frozen fish are held in cold storage is the alteration in texture. Unfrozen raw fish has a firm, gelatinous consistency, and application of pressure does not result in expression of any fluid from the tissues. Frozen fish held in cold storage for an extended period of time and then thawed consists of a solid phase plus drip. Upon applying pressure to the solid flesh, considerable additional drip is expressed.

Similarly, the texture of stored frozen fish may be different, when it is thawed and then cooked, from the texture of unfrozen, cooked fish. Cooked fish which has never been frozen and stored is of a moist, flaky texture, firm but not tough. Only a small quantity of fluid separates from such fish during the cooking process. When frozen fish which has been held in cold storage for a long time is thawed and cooked, considerable "cook drip" separates during the cooking process. The cooked fish itself may be extremely soft rather than flaky. In other cases it may be woody, fibrous, stringy, or tough.

Texture Changes

All these changes in texture involve, either directly or indirectly, the moisture in the fish. In some cases a surface desiccation or drying during cold storage occurs, resulting in actual loss by evaporation of a part of the water. In other cases there may be a change in the manner in which the moisture is held in the fish flesh. Lean fish tissue contains about 80 percent moisture held by colloidal bonds to about 16 percent protein. Alterations which occur to the protein during cold storage of frozen fish result in lowering the capacity of the protein for holding moisture. When the fish thaws, not all the fluid is readsorbed. The resulting tissue is spongy, and additional moisture can be expressed; the texture may be fibrous and tough.

These changes in the moisture relationship to the fish tissue occur to a very small extent in fish which is frozen and immediately thawed. They become progressively worse as the time which the fish is stored or the temperature of storage is increased. Some of these changes in moisture in the fish result in alteration of the appearance as well as the texture.

When frozen fish is inadequately protected against moisture loss by improper packaging or glazing, or when storage conditions are not optimum, considerable moisture may be lost. This loss of moisture has several bad effects upon the product, chief of which are loss of weight, and deterioration of quality.

An important precaution in retarding oxidative changes in frozen fish is to keep the temperature of the frozen fish as low as possible. Some handlers of frozen foods believe that fish can be safely stored at temperatures considerably higher than those used for other frozen foods. Fish which appear to be "hard frozen" are considered by such handlers of frozen fish to be at their optimum storage temperature. Occasionally, special storage rooms at about 20 F are used for fish, while frozen fruits and other products are held at 0 F. or even lower. This practice is completely unfounded. It probably originated from the fact that fish appear to be frozen quite hard at 20 F, whereas fruits frozen in sugar syrups are not hard until a temperature of 0 F. or lower is reached. Actually, the hardness of the product has nothing whatever to do with the determination of the proper storage temperature.

Protective Coatings

In order to help retard the changes that fishery products undergo during frozen storage, some form of protective coating or covering is used. Probably the first "package" that came into general usage was the ice glaze that is formed by dipping the frozen fish in cold water. Because of the widespread practice of using the glaze in the earlier days of the industry, very little attention was given to other methods of packaging.

Not until the introduction of quick-frozen foods in prepared form was any serious attempt made to improve upon protective coverings for frozen fishery products. During the past 10 years, in particular, great strides have been made in the development of these coverings, and although the perfect package is yet to be found, there are available a number of types of materials and packages that offer excellent possibilities for minimizing adverse changes in fishery products during extended periods of frozen storage.

Aside from ice glaze, other protective coatings are listed and described,

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Refrigerated Storage of Tree Nuts

As a part of the educational program for refrigerated warehouse space salesmen The Refrigeration Research Foundation continues the series published in the August issue of INDUSTRIAL REFRIGERATION, with the following discussion of refrigerated storage of tree nuts (pecans, walnuts, filberts, cashews and chestnuts.)

THE use of tree nuts in baked goods, ice cream and candy, as well as for roasting, has stimulated year-round demand for these nuts. Because of their perishability, their susceptibility to insect infestation and wide variation in production level from year to year (especially pecans), tree nuts should be cold stored.

Refrigerated storage is the only economical, large-scale method of preventing nuts from becoming stale, rancid and infested. Fumigation and packaging may protect the nuts from insects and antioxidants, may retard rancidity, but refrigeration offers the best over-all protection.

Storage Stocks

In order to evaluate the refrigerated storage volume of business in nuts over a period of eight years, three year average supply and cold storage figures for the 1948-50 period were compared with the two year average supply and cold storage figures for the period 1953-54. The former figures represent storage practices before TRRF research on nuts was carried out at the Georgia Agric. Expt. Station, and the latter figures represent the storage practices a year or two after this research had established and published the very real benefits of cold storing nuts. Production and storage figures for the last two years have been purposely omitted, because the severe winters resulted in the lowest pecan crops in over two decades.

The average percentage of the total 3-year average crop in refrigerated storage during the peak storage month in 1948-50 was 20.6 percent. This represents both unshelled and shelled nuts (corrected for shelling loss to an unshelled tonnage basis). In 1953-54, the average percentage of the total 2-year average crop in refrigerated storage during the peak storage month was 21.9 percent.

The average crop for 1948-50 was 647.6 million pounds and for 1953-54 was 727.6 million pounds. Although there were many more tree nuts in storage in 1953-54 than in 1948-50, there was only a gain of a little over one percent of the total crop in storage during the peak month.

When the monthly storage volume for the two periods is examined, an interesting trend in nut industry practice can be noted. In 1948-50, the storage of shelled tree nuts reached its peak in July, but in 1953-54, the peak month was May. For unshelled nuts, the peak month in 1948-50 was May, but in 1953-54 it was February.

A more detailed examination of the monthly storage holdings for each year from 1948 to present indicates that this is a true trend. In the past, nuts were only sent to cold storage for the hot summer months, primarily to control insect infestation. Now, large quantities of nuts, especially unshelled, are moving into refrigerated storage in December and January. It is felt that this is a result of the increasing quality consciousness of food manufacturers and users of nuts.

If the facts about the benefits of cold storage for nuts are known, and economically evaluated, the user of nuts will have little choice other than to demand and buy cold stored nuts in preference to nuts from unrefrigerated storage.

Nuts in the shell keep better than shelled nuts. Present industry practice is to store nuts in the shell in the producing areas early in the marketing year and to store shelled nutmeats somewhat later in the year, in the areas of consumption.

Here are the definite benefits and advantages of cold storing nuts:

Benefits and Advantages

1 — Insect infestation is prevented if the nuts are held under 40° F. This is a particular advantage for storing walnuts.

2 — Maintain natural flavor and color. "Old" nuts darken and lose their characteristic flavor.

3 — Extend the marketing season from one crop to the next. Year-round demand is met by year-round supply. This has a stabilizing effect on prices.

4 — Prevention of staling and rancidity. Without refrigerated storage, these expensive products will soon go "off" in the summertime.

5 — Nuts pick up foreign odors and flavors much less readily in cold storage than in common storage.

6 — Wherever possible, the advantage of merchandising nuts under refrigeration should be emphasized and if the consumer is educated to hold a supply of nuts for the family in a refrigerator, both the greater palatability and optimum quality retention of the nuts in the home will be assured.

Thus, the real benefits of refrigeration for these products will be completely realized by keeping them cold from tree to consumer.

Detailed background information about storage conditions and practices for pecans, walnuts, almonds and filberts that will help salesmen in talking with your customer is given in the *Commodity Storage Manual* issued by The Refrigeration Research Foundation.

Premium Rate on Stored Commodities Reduced

EFFICIENT public refrigerated warehousing has effected a cut in the cost of storing government surplus commodities, Gilbert Stecker, President of the National Association of Refrigerated Warehouses, announced. The Surety Association of America has revealed an imminent reduction in the premium rate on the bond required by the Commodity Credit Corporation of warehouses storing its goods. Rates will be reduced from $6.00 to $5.00 per thousand, Mr. Stecker said.

The reduction officially recognizes the "no-loss because of spoilage" record maintained for the past several years by public refrigerated warehouses in the storage of surplus butter and cheese. The credit goes to a long record of safe, scientific storage of millions of pounds of perishable commodities, Mr. Stecker commented. The CCC bonds range from $5,000 to $100,000 for each warehouse, depending on the value of the commodities in storage. The reduced premiums will result in considerable savings both to the warehouseman and to the CCC.

Refrigerated Warehouse Adds Third Floor Space

A THIRD floor addition to the cold storage warehouse of the California Consumers Corporation Los Angeles, Calif., will be constructed immediately by G. D. Gartz Construction Company of 3908 Mission Road Los Angeles. The new floor will provide an additional space of 22,500 square feet. Plans call for cork insulation and vapor sealing. The project was designed by Architect Vincent Palmer, Los Angeles.

Hotel Air Conditions Guest Rooms

LIKE many medium size hotels the Dyckman of Minneapolis, Minnesota has had its public rooms air conditioned for a number of years. However, in 1956 the hotel management and chief engineer undertook to air condition the guest rooms. Actually the air conditioning program is an intricate part of the hotel remodeling program which has been going on for almost three years.

Earl C. Floyd, the hotel engineer, who also doubles as building superintendent, has installed one 60-ton package compressor-condenser-chiller and had a second unit scheduled to arrive and to be installed in early spring. His vendor, however, had difficulty making the schedule and it now appears that the Dyckman will be entirely air conditioned in the late Fall.

To accommodate the machinery required, Floyd has had a 16 x 16 x 10 ft. Armco steel building erected on the third floor roof of the services wing of the Dyckman. The two 60-ton package chillers will occupy this building together with associated pumping equipment, motor controls, starters, etc. Two evaporative condensers are placed on the roof just outside the Armco building, one for each 60-ton compressor plant.

Reciprocating Compressor Plant

Each chilled-water compressor is a 6-cylinder W-type driven by a 60 hp induction motor. New electric service with capacitors for power factor correction was brought into the building by the local utility. Refrigerant is monochlorodifluoromethane, CHClF2; "Freon-22" or "Genetron-141". Capacity steps are provided by compressor capacity control and two separately controlled coils in the chiller. Chilled water is circulated by two 7½ hp circulating pumps.

Three inch chilled water lines run from the steel machinery building on the roof along the old third floor ceiling where furring has been installed giving the effect of a lowered ceiling. These three-inch chilled water lines are piped to the maid's quarters on the third floor and then rise vertically to each floor above. From this location on each floor, branch lines extend down furred corridor ceilings to each guest room.

Individual units consisting of heating and cooling coils, blower unit, and individual temperature controls are placed in each room. In most rooms the units are placed in a furred ceiling space over the entry. In a few conversions the unit is concealed at ceiling level in a closet. Guests dial the temperature they desire to maintain in their own quarters.

Access to the units is the closet is easy. However, a little design ingenuity in the building construction has made access to the units in the furred spaces almost as simple. The acoustic treatment of the ceilings conceals the removable panel which is held in place with friction catches. Units are serviced through this panel. In the event it is necessary to remove the unit, this may be accomplished by removing the former transom to the room and sliding the unit out into the hotel corridor after connections are broken. Condensate from the chilled water coils drain to a riser in the closets between every two rooms on the 3rd floor and hotel ofttends to the second floor ceiling where condensate is removed through existing drain plumbing.

Dual Service System

Although the hotel still has its old steam heat radiation system for each guest room, these are scheduled for removal. The hotel purchases steam from an outside source and will heat hot water to 170 F for winter conditioning of the rooms. Each air conditioning unit is equipped for this purpose and the chilled water circulating system will be used in winter for circulating hot water from the steam-hot water heater.

At mid-year the Dyckman had 64 of the large double rooms completely air conditioned. Seventy of the guest rooms on the 3rd floor and hotel offices on the 2nd floor are air conditioned by 70 window units ranging in capacity from a half to one ton. With the addition of the other condensing-chiller unit and continued work in the guest rooms, Dyckman management expects all 300 guest rooms to be air conditioned by next season.

Most of the hotel public rooms are located on the 2nd floor which is air conditioned by an existing 15-ton system involving two compressors. Since public space is at a premium the units were crowded into quarters which makes repairs rather difficult. When the chiller coil froze up one year and ruptured a tube, the manufacturer's representative could only suggest removing the tube nest entirely and replacing it with a new one.

Saves By On-the-Job Repairs

Dyckman's chief engineer could not see the $600.00 expenditure. He proceeded to install an access door from a pantry adjacent and drew the tube nest into the pantry during sleeping hours. Taking the inside diameter of the tube, he obtained and soldered in the tube nest a tube of smaller diameter concentric with the old split tube. The tube was tested and held pressures 50 percent in excess of those required. The tube nest was replaced and the system has been functioning since without any apparent loss in capacity.

First floor public rooms of the Dyckman are all air conditioned by separate systems with the exception of one — the banquet room which is connected up with the 2nd floor installation. Each individual unit is operated by time clock, turning itself on, defrosting itself and shutting itself down in accordance with the use of the public space for dining, cocktail lounge, etc. In the recent alterations the hotel lobby was equipped for air conditioning and a 10-ton condensing unit is on its way from the manufacturer to be installed in this location.

The hotel makes all its own ice requirements, using three ice makers and city water. The engineer stated that he has not experienced any scaling problems since the Twin Cities water supply is exceptionally pure being only 4½ grams of hardness.

Scrap Sales to Welfare Fund

When questioned by IR's reporter about the disposition of scrap material being removed during hotel remodeling and the installation of new air conditioning equipment, the chief engineer of the Dyckman showed how funds from the scrap metal are being turned back to employee welfare. In most large cities disposition of scrap is usually considered the responsibility of the chief engineer and funds for small transactions accrue to the engineers.

This practice was mentioned to the chief engineer together with the statement that such practice had often caused misunderstanding and difficult relations between management and the engineering department. Dyckman's building superintendent and chief engineer acknowledged the he was aware of such practices and felt that they encouraged corruption in the long run.

Floyd commented that in major alterations the amount of scrap may be unusually large and therefore

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Conserving Losses From Damaged Goods

ONE of the problems in refrigerated warehouse management is that merchandise is received and stored in many different types, sizes and weight containers, and as a result there probably always will be damaged merchandise. So, according to V. C. Stevens, chairman Committee on Warehouse Operations for the National Association of Refrigerated Warehouses, the best thing is to try to handle it in such a manner as to prevent losses as much as possible.

One of the stock complaints heard from customers is "Why can't you handle damaged goods faster and more efficiently? It is impossible to keep my records up-to-date and accurate when claims for damage are held up wating for disposition of the merchandise, etc." Then, if by handling the inspection issue of proper papers, and disposing of damage fast and efficiently pleases the customer, we can use this as an awful good customer-relation "gimmick" worth its weight in gold. We have certainly found this to be true in our operation. It costs us a little more money but it's worth it.

Inspection and Records

We make inspection of all damage at the time the car or truck is received and if deemed necessary photograph it. We use a Polaroid camera for this. The carrier is notified immediately and in cases where damage is not severe and temperature is ok we are advised to proceed with unloading and inspection will be made later. This information is recorded and damaged goods set aside pending arrival of the inspectors.

A file is immediately set up on each car containing damage. This file is checked daily for follow up. In case the inspector does not show up the same or at least the following day, another phone call is made, and a follow up letter is sent to the claim department of the carrier. As soon as inspection is made by the carrier, our report with their report is immediately sent to the customer, asking for disposition.

In some cases the customer does not want salvage returned to the carrier, thus necessitating recoopering by us, with good cases returned to stock and bad merchandise being dumped. In these cases a regular recoopering log sheet is made out showing the amount of material and time consumed in recoopering. An invoice is made out to the customer charging for this recoopering service. This invoice along with our regular OS&D report (Form MDSE 132, printed by The Warehouse Press, Chicago) and necessary warehouse receipt or bill of lading covering disposition of this damage is then sent to our customer along with a letter of transmittal.

This same procedure is followed for truck arrivals with the exception that the damaged goods are received and put in storage immediately for the trucker, awaiting the customer's authority to receive for his account, with claim being disposed of later. The paper work is identical in both cases.

Temperatures of both cars and trucks are taken by us at time of arrival. This includes the top and bottom of the load as well as the ends. Product temperatures are also taken and recorded on our tally-in sheets. In cases where severe temperatures are found, we close the car or truck and notify the carrier that we are refusing delivery until their inspector checks the temperature himself. (This has paid off in occasional instances of concealed damage claims.)

Carriers Cooperate

We have found the carriers in our locality very cooperative and disposition of damage is now being made quickly and efficiently. We credit this to several things:

1 — Complete cooperation with carrier and customer.

2 — Follow-up. This is certainly a "must".

3 — Keeping in contact with the customer — keeping him advised of progress in handling damage. Nothing irritates him more than to be "left in the dark."

4 — In case of recoopering, be sure to recooper and have good merchandise returned to stock promptly and so advise customer. Get damaged goods either returned to carrier or dumped the same day or at least the following day after the final OS&D report is issued.

5 — Have someone in charge of your recoopering section who can exercise judgment.

Remember that we are agents for our customers and they are looking to us to handle their merchandise in the same manner as if we owned it. I know of no better way to improve customer relations than to make his handling of a "problem" a little easier.

Merchants Refrigerating Opens New Warehouse

THE directors and officers of the Merchants Refrigerating Company held an opening July 31 of the company's new refrigerated warehouse at 8501 Page Boulevard, Vinita Park, St. Louis. The plant was open for inspection at 10:00 a.m. and a buffet luncheon was served at 12:30 p.m.

A separate tenant building with breakup and freezer facilities is one of the important new features of the new warehouse. The tenant building adjoining the main warehouse provides breakup and freezer space for 12 tenants. This type of space is in demand by chain store operators and frozen food distributors serving local retail outlets in the St. Louis area. In addition to breakup and freezer space, office space is provided for customers on the second floor.

The tenant building is specifically designed to facilitate frozen food assembly operations. By being located in connection with the warehouse, it eliminates the necessity of distributors withdrawing products from storage and then draying the product to their own premises for breakup. Tenants can thus withdraw any quantity of their products from the main warehouse, have it delivered immediately to their outlets, can then be held in the tenant's freezer space, where temperatures and humidities are rigidly and carefully controlled as in the main warehouse building. Tenants have access to their space at all times. Each tenant has their own loading platform so there will never be any waiting for platform space. The warehouse, with the adjacent tenant space, has a total storage capacity of 1,300,000 cubic feet of refrigerated space.

The truck dock is 25 feet wide and accommodates 14 trucks at one time. Three self leveling dockboards are installed, which adjust to any height truck, and canvas curtains at the doors completely insulate the back of the truck connecting it to the building, thereby minimizing the loss of cold air. The truck dock is refrigerated. The warehouse is completely palletized throughout, enabling efficient handling of merchandise.

Because of its location in a suburb, west of downtown St. Louis, the new plant offers distinct advantages both for in-transit storage and for dealers serving the local St. Louis consumer markets. Truckers find Vinita Park close to major highways and, therefore, avoid the city traffic in downtown St. Louis.

28,117,124 Tons of Ice Sold In 1955 Dollar Sales $235,705,803.

ICE SALES for 1955, reported in a survey conducted by The National Association of Ice Industries amounted to 28,117,124 tons, a decline of 6.85 percent from 1954. Dollar sales amounted to $235,705,803, down 3.85 percent from 1954. Two classifications showed increases over the previous year, ice cube sales and automatic vending outlets.

The year of 1955 was definitely one of ups and downs for the industry, the report says. Some localities had good Ice weather and had what might be termed a good year. Others were plagued with extremely poor weather and the loss of heavy tonnage due to crop failures.

Decline was greatest in the Southeastern, Southern, Southwestern, Northwestern and Pacific Coast Divisions with losses ranging from 9 to 14 percent. The New England, Eastern States and Great Lakes Division had only slight declines and a reasonably good year. The Mountain States had a fine year, an increase in tonnage of 6.88 percent.

For the first time a report is made on the dollar sales of the Industry (Table 3). Cube sales (Table 2) showed substantial gains in 1955, particularly in the Eastern States, Southeastern, New England, Southern, Great Lakes and Pacific Coast Divisions. The Eastern States also showed a substantial increase in sized and crushed ice sales.

There were minor shifts in the types of ice service provided in the various Divisions, as shown in Table 3. For the country as a whole, however, there was little change in the percentage of companies selling cubes and sized ice, the exception being a substantial increase in availability of cubes in New England and the Southern States. There was a 5.6 percent increase in the number of companies offering crushed ice. It is

1955 Ice Sales Summary

1—TOTAL ICE SALES — 28,117,124 tons — a decline of 6.85%.

2—DOLLAR SALES — $235,705,803 — less by 3.85% than in 1954.

3—AVERAGE GROSS REVENUE per ton of Ice sold increased from $7.84 to $8.03 per ton.

4—ICE CUBE SALES totaled 809,149 tons; an increase of 8.24%.

5—SIZED AND CRUSHED ICE SALES were 4,207,475 tons; a slight decline of 1.82%.

6—LOAD FACTOR of the operating plants was 38.96% — last year 41.34%.

7—TOTAL DAILY CAPACITY of operating plants was 197,716 tons; a decrease of 1.17%.

8—THE NATURAL ICE INDUSTRY accounted for 78,533 tons; an increase of 12.6% over 1954's harvest, but still only .28% of total Ice sales.

9—SEASONAL STORAGE — 1,672,700 tons of Ice went into seasonal storage in 1955, against 1,936,000 tons in 1954.

10—AUTOMATIC VENDING OUTLETS for the sale of Ice increased from 7,615 to 8,727; 14.6% more.

TABLE 1—TOTAL ICE SALES IN UNITED STATES FROM 1951 THROUGH 1955

	1951		1952		1953		1954		1955	
Division	Tons	% Change Over 1950	Tons	% Change Over 1951	Tons	% Change Over 1952	Tons	% Change Over 1953	Tons	% Change Over 1954
New England	1,692,702	+ .65	1,803,743	+6.56	1,677,301	−7.01	1,503,029	−10.39	1,482,588	− 1.36
Eastern States	6,356,051	− 1.35	6,471,096	+1.81	6,066,005	−6.26	5,697,798	− 6.07	5,583,272	− 2.01
Southeastern	4,570,615	+ .16	4,512,111	−1.28	4,106,021	−9.00	3,984,483	− 2.96	3,424,265	−14.06
Southern	2,608,750	− 1.52	2,440,225	−6.46	2,383,368	−2.33	2,297,567	− 3.60	2,034,036	−11.47
Southwestern	4,828,050	+13.63	4,856,053	+ .58	4,768,158	−1.81	4,681,854	− 1.81	4,164,041	−11.06
Great Lakes	5,641,360	− 5.36	5,546,021	−1.69	5,314,197	−4.18	4,743,452	−10.74	4,557,983	− 3.91
Western	2,512,571	− 2.64	2,571,365	+2.34	2,603,507	+1.25	2,411,629	− 7.37	2,291,048	− 5.00
Mountain States	1,055,332	− .75	1,003,832	−4.88	1,076,710	+7.26	1,057,975	− 1.74	1,130,764	+ 6.88
Pacific Coast	3,998,497	− 4.89	3,984,502	− .35	3,688,055	−7.44	3,298,965	−10.55	2,993,811	− 9.25
Northwestern	525,574	+ 4.53	549,435	+4.54	550,644	+ .22	507,033	− 7.92	455,316	−10.20
TOTAL U. S.	33,789,502	− .32	33,738,383	− .15	32,233,966	−4.46	30,183,785	− 6.36	28,117,124	− 6.85

TABLE 2—TOTAL ESTIMATED SALES OF PROCESSED ICE IN TONS

	Ice Cubes			Sized and Crushed			Industrial and Block		
Division	1953	1954	1955	1953	1954	1955	1953	1954	1955
New England	64,862	59,578	64,434	132,563	135,323	136,947	1,479,876	1,308,128	1,281,207
Eastern States	204,932	200,272	225,186	656,335	698,615	743,606	5,204,738	4,798,911	4,614,480
Southeastern	76,310	96,983	109,814	509,378	614,039	594,942	3,520,333	3,273,461	2,719,509
Southern	9,313	8,919	12,069	160,380	184,516	190,587	2,213,675	2,104,132	1,831,380
Southwestern	14,786	12,410	11,955	858,607	925,303	782,159	3,894,765	3,744,141	3,369,927
Great Lakes	163,781	135,414	145,123	805,323	822,375	845,484	4,345,093	3,785,663	3,567,376
Western	84,502	86,448	87,624	374,268	416,741	397,779	2,144,737	1,908,440	1,805,645
Mountain States	11,603	10,220	9,836	90,700	87,660	91,684	974,407	960,095	1,029,244
Pacific Coast	126,459	135,150	140,056	260,033	284,753	289,309	3,301,563	2,879,062	2,564,446
Northwestern	2,665	2,145	3,052	117,449	116,300	134,987	430,530	388,588	317,286
TOTAL U. S.	759,213	747,539	809,149	3,965,036	4,285,625	4,207,475	27,509,717	25,150,621	23,100,500
% Change Over Preceding Year	−3.33%	−1.54%	+8.24%	+7.62%	+8.09 %	−1.82%	−8.44%	−8.58%	− 8.15%

TABLE 3—PERCENTAGE OF COMPANIES PROVIDING PROCESSED ICE SERVICE

	Ice Cube Service			Sized Ice Service			Crushed Ice Service		
Division	1953	1954	1955	1953	1954	1955	1953	1954	1955
New England	76.5%	68.4%	85.0%	64.7%	52.6%	55.0%	47.0%	68.4%	80.0%
Eastern States	41.5%	44.6%	46.9%	42.8%	43.1%	39.1%	50.6%	63.1%	65.6%
Southeastern	13.8%	17.4%	18.1%	33.3%	29.3%	31.3%	77.0%	89.1%	91.6%
Southern	9.1%	10.0%	15.2%	36.4%	44.0%	43.5%	70.9%	82.0%	78.3%
Southwestern	14.8%	9.8%	10.3%	35.2%	39.0%	41.0%	70.4%	68.3%	71.8%
Great Lakes	54.6%	46.8%	50.0%	51.2%	50.6%	47.0%	59.3%	62.0%	69.7%
Western	43.3%	38.9%	45.1%	48.3%	48.1%	49.0%	63.3%	64.8%	78.4%
Mountain States	64.3%	64.7%	69.2%	64.3%	70.6%	61.5%	71.4%	58.8%	69.2%
Pacific Coast	66.7%	66.7%	50.0%	29.2%	37.5%	25.0%	37.5%	50.0%	62.5%
Northwestern	15.4%	21.4%	17.6%	53.8%	50.0%	47.1%	46.1%	64.3%	70.6%
TOTAL U. S.	34.9%	34.1%	35.9%	42.7%	43.3%	41.9%	62.6%	70.3%	75.9%

worthy of note that three-fourths of all ice companies now supply crushed ice service.

Total daily production capacity declined 2,344 tons or 1.17 percent. This reduction in capacity held the load factor to 38.96 percent, a decline of only 2.38 percent in the face of a sales decline of 6.85 percent.

Tables 4, 5 and 6 give the gross revenue per ton for 1954 and 1955 for cubes, sized and crushed ice, industrial and block ice, and for total ice sales. It shows the relative importance, by years, tonnagewise and dollarwise, of these same classifications.

The number of automatic Ice vending outlets increased 13.15 percent in 1954 over those of 1953. In 1955 the number again increased; this time from 7,615 to 8,727 — 14.6 percent over the number in use in 1954.

TABLE 4—AVERAGE GROSS REVENUE PER TON OF ICE SOLD

Type of Ice	1954	1955	Change
All Ice Sales	$ 7.84	$ 8.03	+ $ .19
Ice Cubes	23.40	25.91	+ 2.51
Sized and Crushed	12.45	12.88	+ .43
Industrial and Block	6.93	6.95	+ .02

TABLE 5—ICE SALES FOR THE UNITED STATES IN TONS 1954 AND 1955

	1954		1955	
Type of Ice	Tons	Per Cent	Tons	Per Cent
Cubes	747,539	2.5	809,149	2.8
Sized and Crushed	4,285,625	14.2	4,207,475	15.0
Industrial and Block	25,150,621	83.3	23,100,500	82.2
TOTAL	30,183,785	100.0	28,117,124	100.0

TABLE 6—ICE SALES FOR THE UNITED STATES IN DOLLARS 1954 AND 1955

	1954		1955	
Type of Ice	Value	Per Cent	Value	Per Cent
Cubes	$ 17,492,412	7.1	$ 20,965,050	8.9
Sized and Crushed	53,356,031	21.8	54,192,278	23.0
Industrial and Block	174,293,804	71.1	160,548,475	68.1
TOTAL	$245,142,247	100.0	$235,705,803	100.0

Surplus Ice Used For Snow in July

SNOW in July was an unusual event in Indio, California when ninety tons of ice were hauled to Miles Avenue Park and converted into a small mountain of snow by ice slingers. In a temperature of 110 F, more than 500 youngsters, and some oldsters as well, jamed the park as the cool white stuff fell from above and formed a giant snowpile. The small fry, many of whom had never seen snow before, threw snowballs, slid down the "mountain".

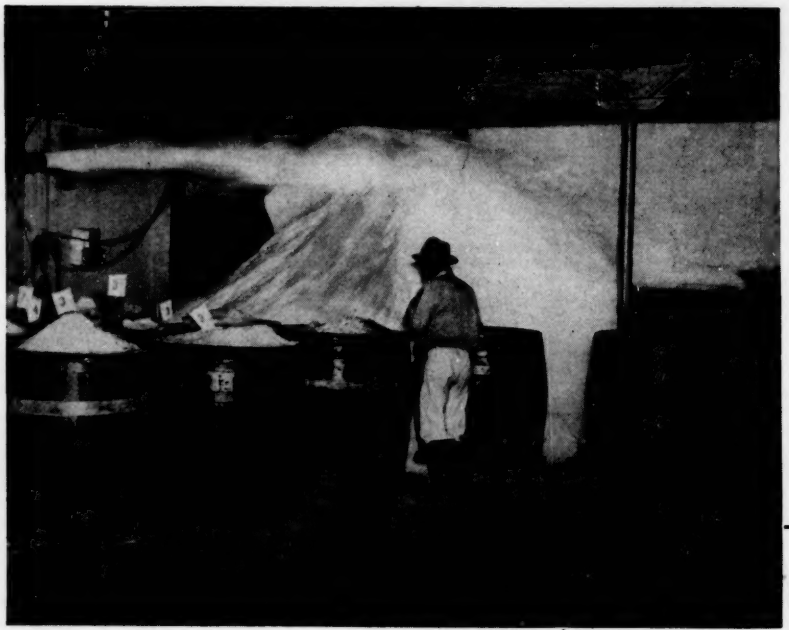
The ice was furnished by the Coachella Valley Ice Company from surplus stock. Converting it into snow was directed by Harry Schlegel and Ed Mason, ice company representatives.

Railroad Enlarges Icing

THE Milwaukee Railroad will enlarge its original plans for icing facilities at its yards at Othello, Wash. New plans provide for an 11-track yard with a 60-car icing platform. The enlarged icing facilities will aid in handling perishable Columbia Basin crops.

Improve service--sell more ice

with a high-capacity, low-cost LINK-BELT Ice Crusher-Slinger



BARRELS OF POULTRY are kept fresh while awaiting shipment in warehouse. Slowly melting ice produced in quantity by Crusher-Slinger assures correct temperature and moisture.

SHIPPERS, warehousemen, wholesalers of perishables offer you a source of profit for top-icing service. They must ice perishables to protect salability—en route or in storage. And there's no better way to get into this market than with a low-cost, high-capacity Link-Belt Ice Crusher-Slinger.

You have a choice of either portable or stationary types with gasoline engines or electric motors—capacities from 15 to 60 tons per hour. Ice particles are delivered uniformly to all corners and crevices for maximum protection. For complete information on Ice Crusher-Slingers see your nearest Link-Belt office. Or write for Book 2382.

14.130

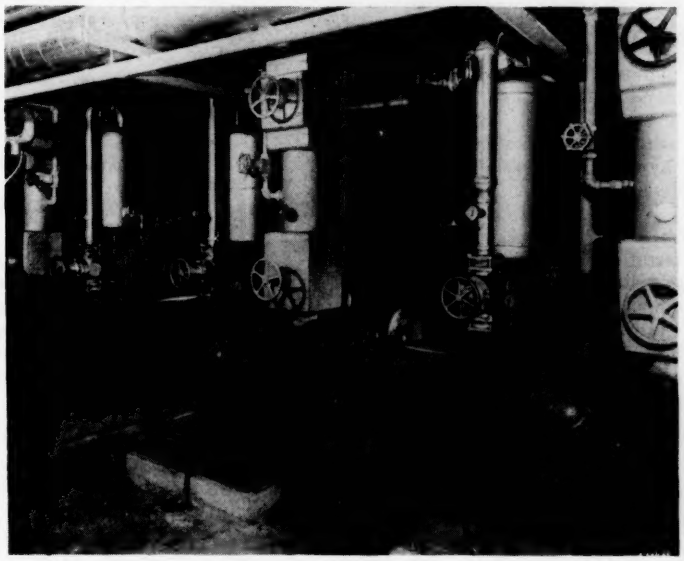
LINK-BELT

ICE CRUSHER-SLINGERS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

Practical Refrigerating Engineer

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS



"It is well recognized that the day of a mechanic making a new part for a compressor has passed. Precision required to make these parts is beyond the ability of the machine or machinist in the average shop."[1]

SOUND MAINTENANCE FOR RECIPROCATING COMPRESSORS in the – Prevention of REFRIGERATING PLANT FAILURES

A. AHUJA and E. A. WEINBERGER
Engineering Department
Vilter Mfg. Co., Milwaukee, Wisc.

NO ONE would buy a new automobile and then drive it 10,000 miles without changing the oil or having it greased. On the contrary, almost all owners would regularly have the car greased and have the oil changed, as well as having spring and fall check-up. Why? Because unless the car receives regular attention, it will soon be a mechanical derelict cluttering up some junk dealer's yard.

Unfortunately, the same people who take parental-pride in the care of their cars, often neglect to give their plant refrigerating equipment the same treatment, even though the equipment costs much more than a new car. It's a well known fact that 50 percent of all plant operating troubles would never occur if an effective maintenance schedule were carried out.

For example, all modern reciprocating compressor equipment is thoroughly tested and adjusted before leaving the factory. If given the proper maintenance it will give tens of years of trouble-free service. However, while precision built high-speed equipment requires very little attention, it must have that "very little" or trouble will result.

Table 1 outlines a maintenance schedule which will keep equipment in excellent operating condition. Plant engineers can match these check-points to their own operating and maintenance practices and proceedures. Make sure your operators and maintenance men understand the rudiments of good maintenance. The end result will be better equipment performance which will win the boss' good-will and in turn lead to recognition of the engineering department as an efficient money-making division of the firm.

Compressor Overhauls

How often a compressor needs to be completely over-hauled depends on how well daily, monthly and yearly operating and maintenance programs have been carried out. If a complete over-haul of the compressor is desired, the additional items listed in Table 2 should be observed. These items to be checked for a complete overhaul are in addition to those listed under "Yearly" maintenance in Table I.

[1]Gerald E. Hicke, "Modern Refrigerating Machine"; NAPRE Operating Data Book, 1952, and 42nd NAPRE Convention, Memphis, Nov. 1951.

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Operating engineers of all refrigerating plants are invited to affiliate with the National Association of Practical Refrigerating Engineers, Inc., an educational association, "not-for-profit".

Replacing Compressor Parts

NAPRE publications have contained many articles on operating and maintenance, the Operating Data Book in particular. Much space has been give in the same Annual also to descriptions of modern compressors. All clearly leave the implied lesson for the operator and maintenance engineer that today's machine is a precison engineered and manufactured product. It compares with a fine watch. Would any engineer today repair his watch with parts of his own making?

Replace parts with guaranteed units or assemblies from the manufacturer. Here's what one engineer told the NAPRE delegates at an annual convention[1]. "It is well recognized that the day of a mechanic making a new part for a compressor has long since passed. The precision required to make these parts is beyond the ability of the machine or machinist in the average shop. Therefore, all parts that are subject to wear and replacement are available as complete sub-assemblies."

Also the watch owner is not likely to use his household screwdriver, tack hammer, and automotive pliers in the repair of that timepiece. The same engineer cautioned further: "It is hoped that in making the replacement, the parts are not abused. In other words, the pinch bar, drift pin and machine hammer are certainly not to be considered desirable tools."

Practical Pointers

Another speaker in recent years, points out the advantages offered alone in the interchangeability of certain parts within the modern reciprocating machine and between several machines. In his paper, "Good Maintenance and Operators Procedure"[2], Dean Harold P. Hayes, NAPRE's Educational Chairman, cites these common parts advantages and describes how standardization of compressors even extends such advantages. Biggest advantage lies in the "significant amount of spare parts which can be carried in stock without a very high investment" — undoubtedly a maintenance practice popular with the boss, purchasing agent, and engineer's storekeeper.

Trouble Saving Procedure

In the same discussion, Dean Hayes gives another practical pointer or trouble-saving procedure for packing compressor shafts of the VSA compressor. His description is based on practice at Modern Ice & Cold Storage, San Jose, Calif., apparently originated by his co-author, Jos. W. Sullivan, then Chief Engineer for that firm. Mechanical seals have eliminated such procedures as this in most high speed multi-cylinder machines, but for the sake of time and trouble saving the pointer bears reviewing[2].

[2]NAPRE Operating Data Book, 1953 — NAPRE CONVENTION, Dallas, November 1952.

TABLE I — OUTLINE OF OPERATING AND MAINTENANCE SCHEDULE FOR REFRIGERATING PLANTS UTILIZING RECIPROCATING (VSA OR MULTI-CYLINDER, HIGH-SPEED) COMPRESSORS.

DAILY	YEARLY
(1) Feel all bearings and compressor cylinders to be sure they are not overheating.	(1) The inspection plate should be removed to draw out oil.
(2) Clean oil filter cartride twice a day.	(2) Clean interior.
(3) Observe compressor oil level; it should be up to the middle of the sight glass.	(3) Check bottom of crankcase for chipped pieces of metal which is evidence of wear.
(4) Maintain log sheet of:	(4) Wipe off kerosene or gasoline used for cleaning parts and coat parts with compressor oil before replacing them.
a) Suction pressure.	(5) Add new oil.
b) Discharge pressure.	(6) Dismantle oil strainers, clean filters and oil lines.
c) Intermediate pressure.	(7) Dismantle oil pump, clean, inspect and reassemble.
d) Oil pressure of all compressors.	(8) Remove springs and safety heads and clean out carbon and residue.
e) Crankcase pressure of all compressors.	(9) Regrind safety head to a tight seat.
MONTHLY	(10) Remove and dismantle all discharge valves and springs and clean thoroughly.
(1) Check compressor V-belts for proper tension.	(11) Refit and reassemble valves and grind valves in tight.
(2) Check shaft seal for oil leak, If there is an excessive leak, replace seal.	
(3) Repack outer self-aligning bearing with grease (every six months).	

NOTE: This table is, of course, not all-inclusive. Engineers should give these lists careful study, and then add points of their own consistent with their equipment, operating practices and maintenance procedures, to these lists.

Avoid Soft Packing

However, Dean Hayes explains how the engineer used two cotton duck rings at the outer end of the shaft packing. Most manufacturers would not sanction this procedure. Soft packing will ruin a shaft in a hurry and manufacturers therefore assiduously avoid its use.

Under careful handling and frequent replacing as described by Dean Hayes, it may be possible to use these soft rings, but this throws the entire responsibility onto the operating engineer. Manufacturers try to avoid such situations by insisting that complete factory produced sets of semi-metallic packing be used for replacement. They give best results and will not damage the shaft.

Oil should be allowed to drip from the packing as described in the Dean's article. Manufacturers also agree with him that the new set of packing should be pulled up slowly. It should be repeated also that the packing gland should never be backed off nor the packing loosened.

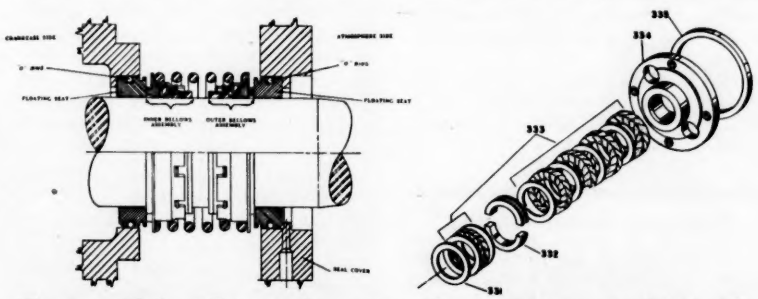


Fig. 1 — Shaft sealing sets for more modern compressors consist of either mechanical assemblies for multi-cylinder units as pictured at the left, or semi-metallic packing in VSA sets as shown in the exploded view at the right. Item 331 is a packing stop ring which fits into the bottom of the stuffing box well. An oil lantern ring (Item 332) receives oil from the crankcase and distributes it into the midst of the packing to keep the rings well lubricated. Parts 334 and 335 are the stuffing box gland and the outboard bearing oil ring, respectively.

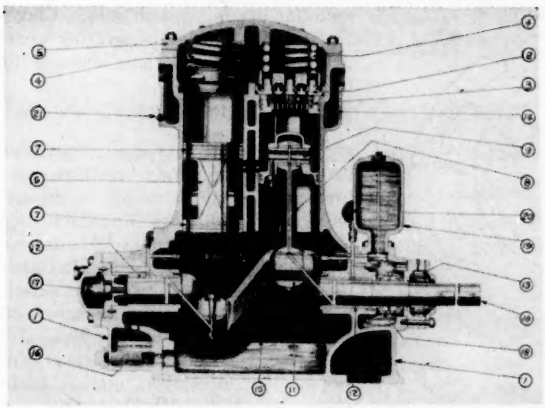


Fig. 2 — Section through Vilter VSA "Freon" compressor, showing typical force-feed oil system and mechanical shaft seal.

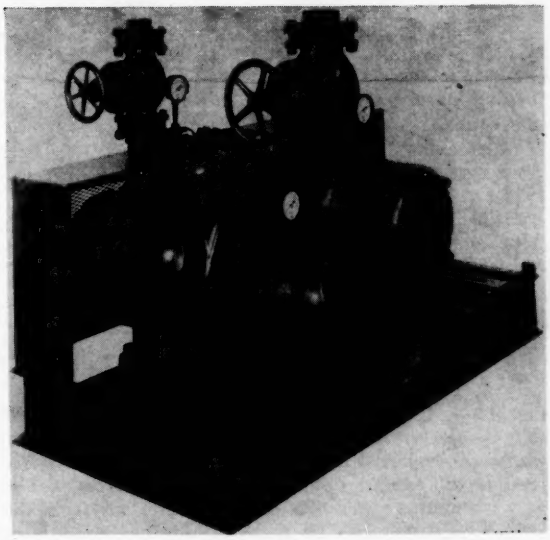


Fig. 3 — (Right) Closeup view of oil pump housing, connections, pressure safety switches, and filter on a Vilter 8-cylinder compressor.

Breaking In New Machines

While reviewing these items and suggestions for sound maintenance of reciprocating units, some comment is in order with regard to breaking in new compressors. Since the secondary objective of NAPRE's Educational Committee, in conducting this series of articles, is to focus membership attention on the usefulness of Association publications, excerpts from the 1943 Operating Data Book[3] will be helpful in itemizing such proceedure. The quotations are from a paper by the late Prof. H. G. Venemann, Purdue University, NAPRE's Educational Chairman for 15 years.

Compressor Test

"All high-grade compressors are given a thorough running test at the factory, then certain parts are protected against rust by a coating of grease which must be carefully removed before putting the compressor into service.

(1) Remove heads.

(2) Remove safety heads and completely take apart the discharge valve assembly, carefully noting the numbers on the various parts so that they may be re-assembled after cleaning exactly as they came apart with each valve in its own cylinder. Do not assume that these parts are interchangeable.

(3) The grease should be washed off with safety solvent, the parts thoroughly dried and then coated with clean ice machine oil, preferably the oil shipped with the compressor. The top of the pistons, suction valves and cylinder walls should likewise be cleaned and dried, then sufficient ice machine oil should be poured on top of the pistons to thoroughly oil the valve stems and springs.

(4) While the cylinder heads are off, turn compressor over a few revolutions to see that all suction valves are working properly.

(5) Remove cover plates from side of compressor and clean out crank case. Check direction of rotation of oil pump.

(6) See that all connecting rod bolts and nuts are tight, and that all cotter pins are in place. Check the adjustment of the crank pin bearings.

(7) Fill the crank case with oil to the level indicated and replace cover plates. Its is advisable when first breaking in a compressor to carry the oil level sufficiently high so that the connecting rod boxes on the down stroke will be covered about half way with oil.

Special Note on Piston Oil Rings: Each piston of a compressor is usually provided with a drain oil ring, and the ring groove is drilled for draining the excess oil back to the crank case. Some manufacturers purposely close the drain-oil holes with small screws, so that the piston, cylinder wall and working parts will be amply supplied with oil during the breaking in period. This may cause excessive oil pumping. If after a period. of three to four weeks it is found than an excess amount of oil is pumped, some of the drain-oil screws should be removed. Sight feed lubricators when uced should be set at first to feed at least 15 drops per minute to each cylinder. This may later be reduced to about 8 or 10 drops per minute.

TABLE II — ITEMS TO BE INSPECTED, CHECKED RE-USED OR REPLACED, IN COMPLETING A THOROUGH RECIPROCATING COMPRESSOR OVERHAUL.*

Assemblies	Inspect	Check for Wear	Clean	Work
Pistons	X	X	X	Pull Remove pin & rings
Rings	X	X	X	Replace if needed
Suction Valves	X		X	Remove Reassemble Grind in
Wrist Pins & Bushings	X	X	X	Refit or Replace
Clearance Pockets	X		X	Dismantle Regrind seats Reassemble Repack stems
Bearings	X	X	X	Refit or replace if badly worn
Lubricator	X	X	X	Dismantle Replace worn parts Reassemble.

*These items are in addition to those listed under "Yearly" heading in Table 1.

[3]"Instructions for Operation and Maintenance of Refrigerating Plants, (Part I)"; H. G. Venemann, 1943.

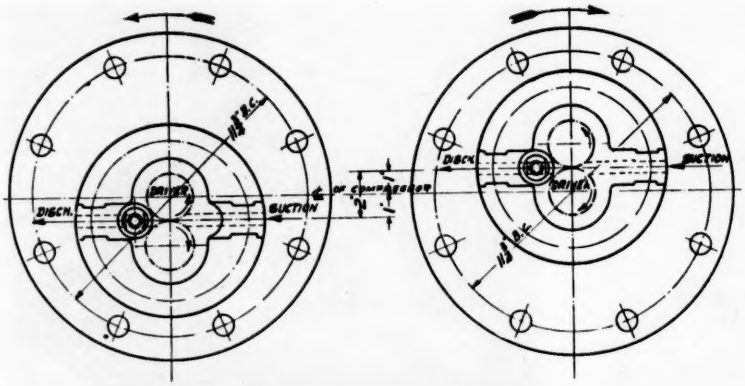


Fig. 4 — Assembly of oil pump mechanism for standard clockwise (left) and counter clockwise rotation (right) of shaft on older style VSA NH, machines. Newer Vilter compressors are equipped with automatically reversible oil pumps. Consequently, these compressors may be run in either direction and no rotation tag is required.

(8) Replace the cover plates.

(9) Check the oil in the outboard bearing.

(10) Turn on water to the compressor jackets.

(11) Start the motor or engine and run for about an hour, during which time, check the operation of the oiling system, the oil pump, and the bearings for heating. During the first few days of operation the bearing oiling system should be given all the pressure the pump will produce.

(12) After this trial run clean out the upper part of the cylinders, replace the valves, safety heads and cylinder heads.

(13) Remove covers from the suction strainers, clean screens and replace. The compressor is ready to run.

Lubrication

Enclosed compressors have either splash or force feed lubrication to inside bearings, and oil ring or oil chain lubrication to the outboard bearing. The modern compressor is equipped with a gear oil pump driven from the end of the crankshaft which takes filtered oil from the crank case and forces it to all of the bearings. An added feature to some compressors is the auxiliary force feed lubricator which supplies oil to the wall of each cylinder on the thrust side and to the suction of the compressor to lubricate the valves. Every manufacturer has his own design of oil pump which is housed inside of the crankcase. Its direction of rotation is fixed by the manufacturer to conform with a specified direction of rotation of the crankshaft. If the compressor is to operate in the opposite direction to that specified by the manufacturer, the direction of rotation of the oil pump must also be changed according to the manufacturer's instructions. Check this carefully before operating compressor to avoid serious damage to the bearings.

Illustrations

Fig. 2 shows a typical oil system for a Vilter 2-cylinder vertical compressor of modern design as manufactured by the Vilter Manufacturing Co. Fig. 3 is a closeup view of oil pump housing, connections, filter and the associated oil pressure safety switches. Fig. 4 shows assembly of oil pump mechanism for standard clockwise rotation of flywheel and for counter clockwise rotation both when viewed through the wheel.

References:

Maintenance and Repair of Ammonia Compressors; NAPRE Operating Data Book, 1942.

Maintenance Program and Methods In Refrigerating Plants; the late Robt. C. Doremus, NAPRE Operating Data Book, 1945.

City of New Orleans Starts Apprentice Program

AN engineer's apprentice program which includes vocational instruction will start with classes at the Isaac Delgado Trade School in September, it was announced by Edwin I. Soule, assistant director of the school. Soule made the announcement on a visit to the INDUSTRIAL REFRIGERATION Editorial offices July 24.

Past National NAPRE President Leo J. Vivien, Executive Secretary, Board of Examiners of Operating Engineers, Dept. of Safety and Permits, New Orleans, has been assigned the task of organizing the apprentice program. Vivien and Soule visited Chicago on a recent tour of metropolitan cities having apprentice programs. Cleveland and Columbus, Ohio, were on the itinerary. The State of Ohio has an operating engineers' apprentice program, but in Chicago, Soule and Vivien observed the Pipe-fitters' apprentice program which includes an excellent refrigeration course of instruction.

Appropriation Covers Cost

It was learned that the City of New Orleans has set up an appropriation which covers the hiring of an instructor, purchasing of equipment and supplies, and for miscellaneous contractual services to get the program started. An apprentice committee will be established consisting of a public, employer and labor representative. Facilities at the Delgado school, a privately endowed school willed by the late Isaac Delgado to the City of New Orleans, will be expanding gradually to house equipment and accommodate the engineering apprentice enrollment. Standards for apprentice training compiled by the U. S. Department of Labor are being used as a guide in setting up the program.

Purpose of Chicago Visit

The purpose of the Chicago visit was to inspect the Chicago Board of Education's Washburne Trade School. This trade school in Chicago handles apprentice programs for the building trade, publication arts and crafts and the catering trade as well as sales clerks and personal services such as beauty operators.

New Orleans' representatives Vivien and Soule were guests of Martin Brauns, Jr., Director and Joseph J. Portle, Assistant Director, for the conference and inspection at Washburne. Other Washburne staff members assisting the New Orleans visitors were Robert B. Hill, Supervisor of Curriculum and Dan M. Stump, Heating, Ventilating Refrigeration and Air Conditioning instructor. Short inspections were also made of the plumbing and electrical departments at Washburne.

Ed Thomas, U. S. Department of Labor, Bureau of Apprenticeship, Chicago, escorted the New Orleans visitors and contributed standards materials for use in the day's discussion. Bert C. MeKenna, Vice President of NAPRE and J. Richard Kelahan, Technical Editor of INDUSTRIAL REFRIGERATION, were observors.

From the President's Desk

Los Angeles Makes Major Contribution to Venemann Memorial Fund; Also Signs Up First Industrial Member

SUMMER 1956 will be one of the most pleasant of NAPRE's memories for your National President. Two outstanding events made it so, in my opinion. It is difficult to say which would have top place if I were required to make a choice.

California Chapter No. 2, NAPRE, has topped all previous contributions to the Professor H. G. Venemann Memorial Educational Fund, and have thereby challenged other chapters to beat their record. Naturally, the members at Los Angeles do not expect other chapters to top their achievement in total dollars, but they expect that the competitive spirit of NAPRE members will spur other chapters to equal their achievement on a per capita basis.

As a matter of fact, some of their more distinguished Past Officers felt confident that a certain Chapter in the South would probably not delay very long in establishing a new record for membership contributions to this Fund. I rather expect to see this same good-natured spirit of competition between NAPRE's two largest chapters result in an outstanding success for the Venemann Fund.

Another event which has had a very stimulating effect for your NAPRE leaders was the opening of our Industrial Membership Drive and acceptance of an application which the Association received from Refrigeration Engineering Inc., Los Angeles. Again, the local Los Angeles Chapter committee was on the alert and scored a "first" in this activity by having all such membership prospects "prepped". Firms in their area were first to respond favorably.

NAPRE is happy to welcome "Recold" and the many other Industrial members who applied during the summer months. All will be honored at a very special breakfast at our National Convention in Detroit's Statler Hotel on Wednesday, October 31.

Unique Fund Drive

Los Angeles Chapter acquired the funds necessary for their outstanding contribution to the Venemann Fund thru a very unique method. The Chapter Treasurer, Past National President Emmett T. Quinn, had all the membership dues invoices printed this year with a second item. This item appearing on the invoice was to the effect that the chapter was accepting contributions of at least one dollar from each member for the Venemann Fund.

Quinn reports that the method proved highly successful. Even delinquents enclosed a minimum of one dollar remittances. As a result, the chapter came within a few dollars of a very round figure which appeared on the face of the Bond. They hope to repeat this procedure next year.

Past President Regis Gubser who heads up the Venemann Fund, stated at the presentation that this should be convincing evidence to the refrigerating industry that NAPRE is quite willing and able to shoulder its educational responsibilities on a dollar for dollar basis with industry's interest in NAPRE. He explained that it is a policy of the Fund Committee not to disclose the exact amount of any contribution, but he was quite pleased to relate that this has been the largest unit contribution to date.

NAPRE President Leroy Etzel congratulates Los Angeles Chapter members thru their President Clifford P. Scott (right), while Scott presents a U.S. Savings Bond to Regis Gubser (left), Fund Chairman.

Back To School Month

September brings school days to more than children and grandchildren of NAPRE members. Now that Chapter vacations are over, local educational committees should have their Fall programs lined up so the first September meeting will be interesting to both the new as well as older members. Those of us who have been busy during the Summer with refrigerating problems can pass along our solutions at the first or second session of the Fall term. Get those refrigeration classes started, as well as the Question Box and Speaker Program.

It is now time to check on your membership gain to see where your Chapter stands with reference to the trophy awards to be given at the Detroit Convention next month. Many Chapters will be surprised at the record Denver has made since it was granted its charter. Even Detroit is throwing host-like ethics to the wind and contending for a trophy.

Membership Drive Continues

Air conditioning for public buildings as well as for homes has been a very live subject due to the excessive heat this past summer over most parts of the Nation. We should make an effort to gain more membership from this phase of the refrigeration industry. Installations are in excess of engineers needed to operate central systems. As other mechanics are diverted or persuaded to take charge of such systems, they welcome a call from an NAPRE member. The member represents practical assistance, advice and an organization with a helpful program.

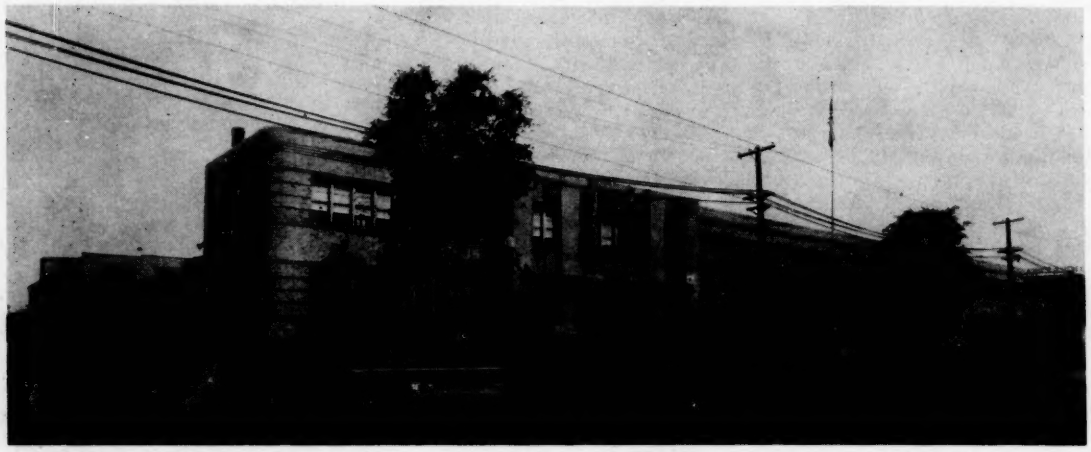
Member-at-Large Cops Report of the Month

N. S. Chadha forwarded Vice President Frank Chase a report which the Committee feels takes the spotlight away from the Chapters this month. Chadha reports on a book that he and a colleague are writing, plus a detailed description of his plant in India.

L. Etzel

Milady's Confections

Refrigeration in a Confectionery Factory Improves Quality and Production



Main plant of Fred Sanders, confectionery manufacturers at Detroit, Mich., on official NAPRE convention tour, uses 675 tons refrigeration for daily production.

LEO C. GAGE

Publicity Chairman
Detroit Convention Committee, NAPRE

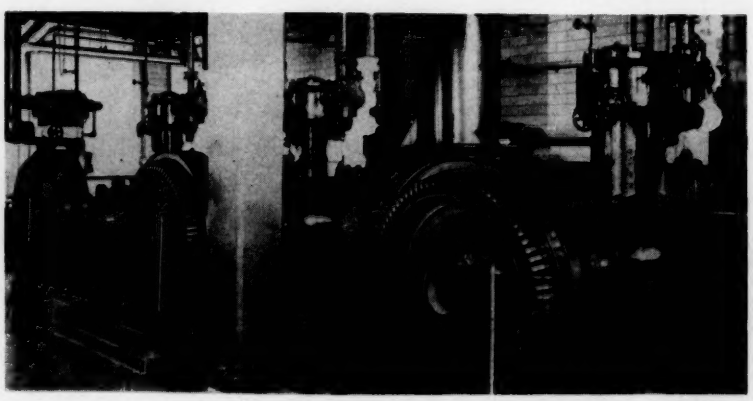
TWENTY-FIVE temperature controlled areas contribute much to the quality control and production methods of ice cream, candy and baked goods produced daily by the Fred Sanders Corp., Detroit, Michigan. This 81 year old establishment utilizes 675 tons of refrigeration in the manufacture and distribution of 20 million pounds of candy, and over 900,000 gallons of ice cream, annually.

Detroit members of NAPRE and their families have enjoyed Fred Sanders' products through several generations. Today, more of them than ever before are able to obtain these products through 37 retail stores and 30 supermarket departments. However, few practical refrigeration engineers or their families stop and reflect on the amount of refrigeration required in the production of various confections. Ice cream perhaps brings to their minds immediately the fact that refrigeration is required, and some may even stop to figure out the fraction of a ton required for the family's monthly consumption. It is very unlikely, however, that any consideration is given to the tonnage required in the production of the family's candy for a year.

NAPRE's 47th Convention at Detroit will provide an opportunity for local members and delegates alike to visit the main plant of the Fred Sanders Corp. as an extra convention or post meeting attraction. Sanders' firm has opened their facilities to conventioners from Tuesday, October 30 through Friday, November 2. Arrangements can be made with the Detroit Convention Tour Guide who will handle groups of 14 through the plant daily from 9:00 a.m. to 1:00 p.m.

First Ice Cream Soda Originated by Sanders

This Detroit firm takes credit for being the first soft drink emporium company to introduce the ice cream soda. It is commonly believed that the substitute sweet cream soda concocted by Fred Sanders in 1880, was the first of its kind in the United States. Actually what happened was that on a particularly warm summer evening Fred Sanders discovered that all his sweet cream had soured. That was the principal ingredient for fruit flavored beverages at that time. Since Sanders had some of his



Four York VSA Compressors for the NH_3 System at the Sanders main plant.

Fig. 4 and 7 Courtesy of Armstrong Insulator, Publication, Insulation Division, Armstrong Cork Company, Lancaster, Pa. Other photographs courtesy of the Fred Sanders Corp.

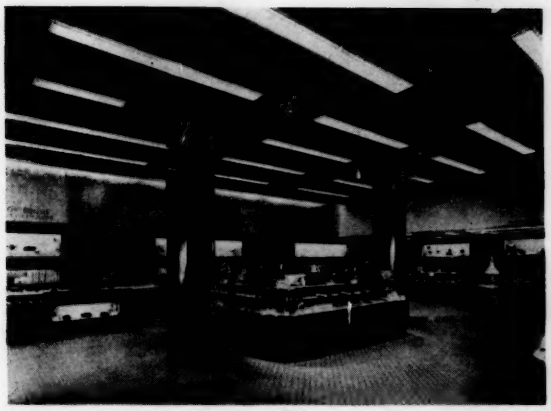


Fig. 1—Downtown Fred Sanders store where air conditioning is considered essential to quality. Anemostats distribute air over main sales area.

Fig. 2—Famed Pavillion of Sweets where Fred Sanders started his candy concern on its more than four score years of growth. This shop became a Detroit landmark.

own ice cream readily available he decided to try it as a substitute for the sweet cream commonly used. Apparently his customers were well pleased as the word spread and it wasn't too long before every soda fountain in the country was serving the same cool concoctions that are so well known today.

Actually the Fred Sanders company started its success story in Detroit in 1875. Fred Sanders had been burned out in the Chicago fire and migrated to Detroit. He opened a candy shop in the summer kitchen of his home where he worked days marketing his product and long evenings manufacturing the sweets for the next day's sales. Financing, ice cream soda incidents and other unexpected events turned up that developed the resourcefulness of Frederick Sanders, and from that knack or ability he turned many a setback into a business gain. The Fred Sanders Corp., has grown to its more than five dozen outlets and main plant in Detroit.

As the city of Detroit grew, Sanders shifted his operations. In 1890 he opened a pavillion of sweets (Fig. 2) which became a city landmark. One of the later attractions of that location was the World's Fair Fountain which he had purchased at the 1893 Chicago Fair and relocated in his enterprise(see Fig 3). In 1912 he established a bakery which had been his first interest, but died in 1913. However, his firm continued to grow and expand. A second store and a factory were established in 1915. By the advent of World War II there were 21 Sanders' establishments in the Detroit area. This included a one and a half million dollar plant built in 1940. Following World War II the firm continued its expansion to include the retail outlets previously mentioned.

Refrigeration Applications

The modern confection business today utilizes many refrigeration applications. Raw materials storage, processing, manufacturing, distribution, and point of sale all require refrigeration of some nature and at widely varying temperatures. The Fred Sanders Corp. utilizes 1600 horsepower in their refrigeration applications alone. Both ammonia and fluorinated hydrocarbon refrigerants are used in the many systems found in the main plant and 67 retail outlets.

Air Conditioned Retail Outlets

Sanders' own 37 stores are air-conditioned with 5 to 10 ton package units averaging a total of 20 to 25 tons per location. Their 30 supermarket outlets are air-conditioned at most locations from the central air conditioning system of the building in which they are located.

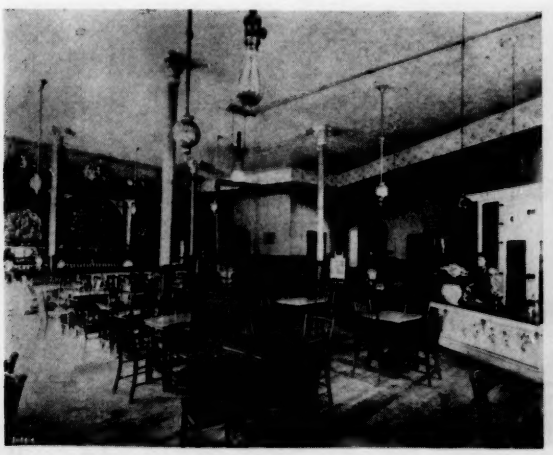


Fig. 3—Sanders installed the World's Fair Fountain at the 1893 Chicago Fair in the Pavillion of Sweets.

Fig. 4—Candy cookers are located in the large manufacturing room, adding to the air conditioning load.

Fig. 5—Ice cream mixer, pasteurizer, and homogenizer in the Sanders plant. Pasteurizer uses chilled water for initial cooling and direct expansion ammonia for finishing.

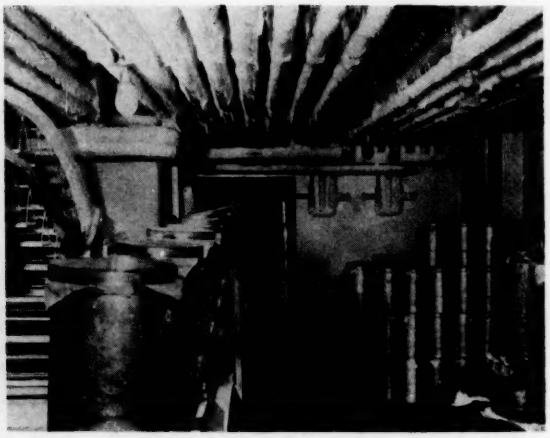


Fig. 6—Interior of combination hardening and holding room for ice cream confections. Motor driven conveyors bring product into room for freezing. Out-loading is both by hand truck and conveyor.

Candy Refrigeration

Sugar, syrup, nutmeats, chocolate and other ingredients for milady's chocolates are stored at 50 F. Chocolate dipping or enrobing operations and product cooling at various stages of manufacture require refrigeration. Perhaps the candy cooking dept. (pictured in Fig. 4.) contributes the greatest heat load of all operations. In this main plant such operations are carried on in the large conditioned room pictured, which utilizes direct expansion ammonia to maintain the working area at 78 F. Dipping or enrobing machines themselves utilize refrigeration at 68 F. The machines are refrigerated with fluorinated hydrocarbon systems. At the point of sales, Sanders' candies are retailed in the air-conditioned stores which helps retain the quality imparted to the product in the carefully controlled air-conditioned factory.

Refrigeration for Ice Cream

Raw milk, ice cream mix, syrups, fruit and nut ingredients for the manufacture of one of America's most popular confections are processed and held at respective temperatures of 32 to 50 F at the Sanders' plant. Fig. 5 shows three of these operations, one of which needs refrigeration. Ice cream manufacture is carried on at 15 F and hardening the product is accomplished in tunnel freezers and hardening rooms held at minus 15 F. One such room is pictured in Fig. 6. Holding rooms in the establishment have minus 5 F temperatures.

Distribution of the ice cream is by insulated trucks, utilizing dry ice in shipping containers. However, the firm has some new trucks on order which will utilize unit type condensing systems.

Package sales of ice cream at the retail outlets are from cabinets which are held at minus 5 F. Fountain operations and cabinets involved in fountain and restaurant service are held at 15 F. Like the candy outlets, all Sanders' fountains are air-conditioned.

Bakery Refrigeration

Even the baked goods manufactured by this firm get in for a share of refrigeration. It appears that it may even involve more refrigeration for this line in the future. Perishable ingredients destined for the finished baked product such as syrups, oils, fruits, nuts, etc., are stored at 50 F. Yeasts are stored in a special compartment of their own at 34 to 36 F. At present Sanders has not air-conditioned its sugar or flour storage for bakery goods, nor have they gone into production freezing of any of their line. However, they are keeping close eye on the advantages that the frozen product may offer them in labor saving and production leveling. Mrs. Housewife, however, may have a great deal to say in the decision of this firm to enter the frozen baked goods field. At present their products are retailed through their own outlets and their daily deliveries would not necessitate freezing the product for distribution and holding purposes. A view of Sanders bake ovens is shown in Fig. 7.

The main plant of the Sanders company utilizes many refrigeration systems, both NH_3 and the so-called "safe refrigerants". Contrary to expectations, the visitor will not find any multi-suction or many tempera-

Fig. 7—Battery of ovens used by the Sanders bakery department.

ture system. Each temperature level application has its own individual machine. However, these systems can be grouped in a classification of from 40 to 50 F used for the dry raw ingredient storage, candy enrobers, and coolers in such high temperature applications.

Low temperature systems for ice cream freezers, hardening, etc., operate in the vicinity of minus 25 F. The plant has no latent heat applications at the present time. However, some ice water is used in the bakery manufacturing and in connection with some of the candy enrobing operations, in addition to the plant's drinking water system. Air conditioning takes a large percentage of the refrigeration applications, the main plant being air-conditioned. General offices of the firm and, as mentioned, retail outlets are also air-conditioned. The air conditioning systems employ separate compression-condensing systems. One portion of the compressor plant is shown on page 32.

The main refrigeration plant consists of seven compressors ranging from 40 to 125 hp. All are direct driven by electric motors, which are controlled manually. However, each refrigeration system has its own controls once the compressor has been placed in operation. These are all mounted remote from the machine on panels where they are readily observed by the operating personnel.

Chief engineer of the Frederick Sanders Corp. is Michael Wurmlinger. Five operators are employed by the firm to run the machinery and maintain it.

Refrigerated Room Construction

Sanders has 18 storage rooms with temperatures from 0 to 50 F and four at slightly below zero temperatures. The remaining rooms are at even lower temperatures, being principally used for hardening and holding rooms. The higher temperature storages utilize four inches of Armstrong corkboard insulation applied in two layer work and finished with cement plaster. The low temperature rooms are insulated with six inches of insulation in common walls and eight inches of insulation for outside walls, floor and ceiling. The Armstrong corkboard is applied in three layer construction and cement finished.

Fred Sanders Co. spokesmen indicate that cold rooms constructed with the initial plant building have required practically no maintenance. However, the plant personnel are instructed with regard to misuse of all facilities, a preventive measure.

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NAPRE

Question Box

The National Educational Committee, NAPRE, answers monthly in this column, operating problems forwarded by members. The Committee appreciates answers from the field. Address questions and answers to Prof. Harold P. Hayes, Dean of Engineering, State Polytechnic College, San Luis Obispo, Calif.

Hot Basement Location Reverses Condenser—D.E. Coil Functions

QUESTION NO. 1124: We have a compressor and its associated condensing equipment located in the basement floor of our building in a pipe gallery. Since steam lines, hot water and other utility equipment is located in the immediate area, temperatures are often in excess of 90 F.

Direct expansion coils for the air conditioning system which this compressor serves are located on the 3rd floor of the building approximately 44 feet above the condensing plant. We always get rather wet gas back to our compressor and generally lose all the oil out of the compressor crankcase on start-up (See Figure 1 below):

The compressor itself is a 4-cylinder 4½" bore No. 7G6 Carrier. The refrigerant is "Freon-12". We operate at 35 pounds suction and 145 pounds head pressure. Liquid leaves the combined condenser receiver and rises to the third floor where it passes through an Acme 14-inch by 4-foot heat exchanger. It is supplied through Sporlan expansion valves with ⅜ inch ports to two American Blower Company coils. The Sporlan valves are thermo bulbs operated through an external pilot.

The direct expansion coils are 18 tube No. 86 type CH with the tube length of 4 ft. 6 inches. On the low side at the compressor a Hubbell back pressure valve is located. This is a temperature controlled, air piloted type of valve which we have by-passed at present. The compressor is equipped for 50 percent capacity reduction, also air controlled.

The operating department here would like to relocate the compressor and condenser on the 3rd floor, but meets with opposition from the engineering and building departments. It is the operating department's contention that our high condensing location and the long liquid lift allows considerable flashing to take place before the liquid ever reaches the coils. The large expansion valves also permit more liquid to enter the coils than is needed. During shut down the coils actually act as a condenser. We believe this is what results in the return of wet gas and slop-over to the compressor.

Further, the operating department contends that wet gas returning to the compressor is the cause of the oil boiling off with the refrigerant on start-up. What sort of controls would you recommend to prevent this slugging and oil wash-out?—E.W.A., St. Louis, Mo.

ANSWER: As you have stated in your last paragraph, the problem may be divided in two parts: (1) "slugging" of the compressor and (2) oil leaving the crankcase compressor during starting periods.

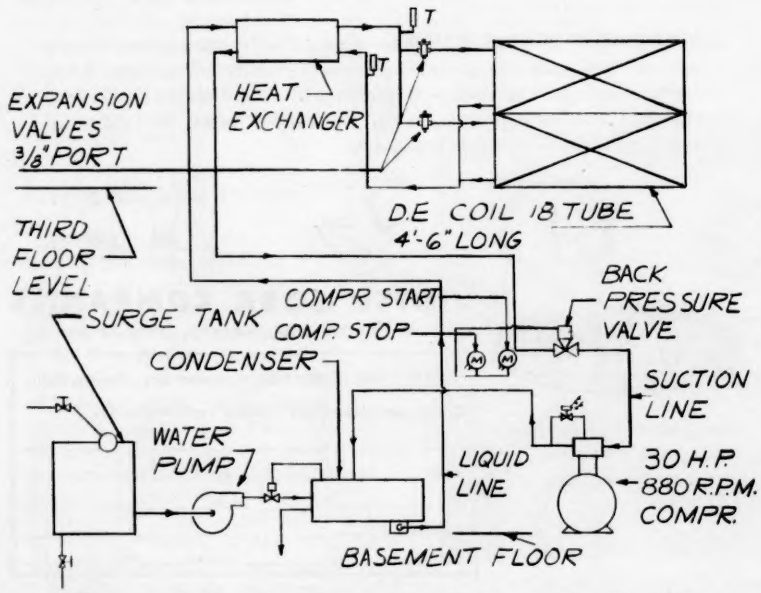


Fig. 1 — Section view of system described in question No. 1124

Many things may cause the slugging. It is possible that the expansion valves are oversized. Unless the expansion valves are greatly oversized, this is probably not more than a contributing factor. If the seats of the expansion valves are not in good condition, leaking of the liquid refrigerant to the coil may occur during shut-down periods.

Again, if the thermal bulbs of the expansion valves are placed in a warmer position than the coil, the bulb will warm up quicker than the coil and cause the expansion valves to open. Also, if the coils are in a cooler location than the compressor, a limited amount of refrigerant vapor may flow up the suction line and condense in the coil. The amount would probably not be large since it would need to come from the oil in the compressor crankcase.

Where difficulty with slugging occurs, the situation may often be corrected with suitable automatic electrical pump-down connections. The electrical circuit on your system is not known so the circuit given in Fig. 2, next page, is an example.

The pressure switch is set so that it cuts out at about 5 psig. With connections as shown in this diagram, the compressor cannot be started without the fan in operation but the compressor will continue to run after shut-down of the fan until the coils are pumped down to nearly atmospheric pressure. It may be possible to use some variation of this type of electrical circuit with your system.

Let us now examine the problem of oil leaving the compressor crankcase. On air conditioning systems where the compressor is not in operation during the night-time, liquid is absorbed by the lubricating oil in the compressor crankcase. Upon starting up the crankcase pressure is lowered and this absorbed refrigerant is evaporated carrying a considerable portion of the oil with it. If the refrigerant lines are short, properly sized and layed out, the oil quickly returns to the crankcase compressor. But of the refrigerant lines are long, it will take considerable time for oil return. Where it is necessary to use long refrigerant lines, a discharge line oil trap should be used with the compressor.—N.S., San Luis Obispo, Cal.

Confused On Terminology For Solenoid Positions

QUESTION NO. 1125: When using the terms NO and NC, would you explain whether or not the operating magnet is energized in a magnetically operated relay such as are used in switch gear and solenoid valves? L. M.E., New York.

ANSWER: (In answering this question, I have interpreted the question as follows: Would you explain how the magnet is energized in a magnetically operated motor switch and a solenoid valve?)

When using a magnetic starter on a 3-phase motor, the magnet in the starting switch is normally energized by a push button station to control the holding coil which operates the magnetic starter. A solenoid valve may be placed in the line after the starting switch between the

switch and motor which will be controlled by a push button station. When the push button station is in the off position, the magnetic starter and solenoid valve is not energized.

(Note: See July and August, 1955, INDUSTRIAL REFRIGERATION, "Practical Refrigerating Engineering" — "Basic Electrical Controls for Refrigeration Systems", by Howard Wolfberg.)—J.M.M, San Luis Obispo, Cal.

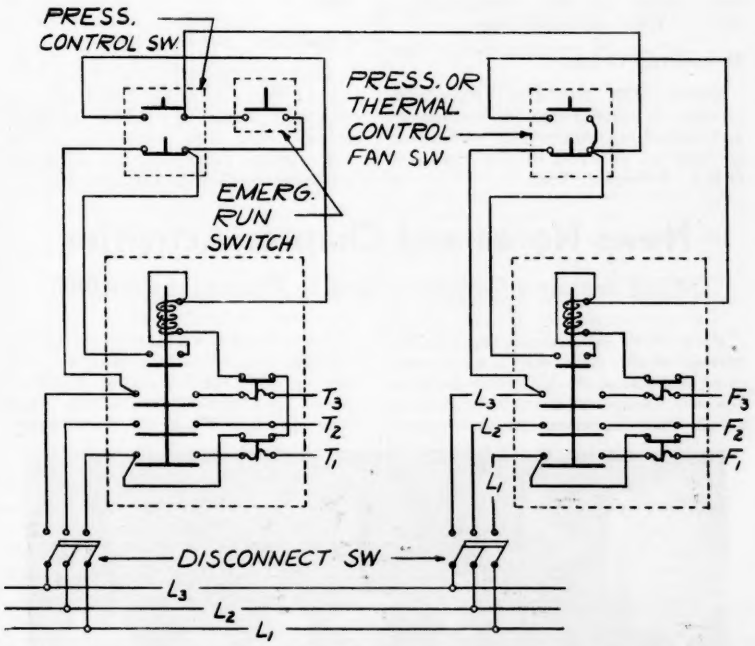
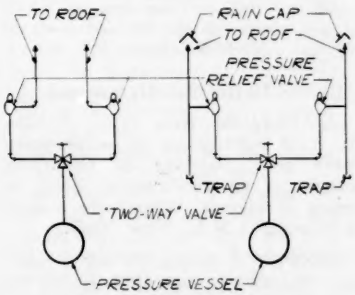


Fig. 2—Suggested hookup between fan and compressor starters which would require fan to operate before compressor could start.

Relief Valve Corrosion

QUESTION NO. 1126: During examination of the relief valves in our plant, all of which are piped to the exterior of the building, an amount of corrosion was found in the discharge piping and in the discharge opening of the valve itself. There is some speculation that the relief valves would be corroded shut. Has this been known to happen? How can we prevent corrosion of this nature? L.M.E., New York.

ANSWER No. 1: It has been known in the past that relief valves have corroded shut. If there is any speculation whatsoever on your part that the relief valves are corroded or in danger of becoming corroded shut, you must correct the



trouble immediately or you are defeating the purpose of the relief valves. It might be that water condensation is forming, or rain is collecting to cause your corrosive condition.—J.M.M., San Luis Obispo, Calif.

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ANSWER No. 2: To prevent corrosion in relief valves and associated vent piping in my plants, I place sufficient ice machine oil in outlet of valve to keep a seal over disc and seat; also coat spring, spindle, etc. This effectively stops corrosion. If relief lifts, gas pressure will blow this insignificant amount of oil.

Piping from the outlet, if rising vertically through the roof, can be capped or arranged to prevent rain from entering. However, vent piping passing through areas where lower than atmospheric temperatures would cause condensation, should be provided with a trap at the extreme outlet. This trap can be filled with enough ice machine oil to seal the trap only. That will prevent condensation back in the vent pipe.

If the relief outlet must be run horizontally, pitch slightly away from the valve and trap any vent line into which it may tee, below the tee (as shown in the fig).—B.C.McK, Chicago, Ill.

Micron Definition Requested

QUESTION NO. 1127: Articles in trade publications in recent years have been referring to impurities caught in air conditioning filters in terms of microns. What is the size of a micron? L.M.E., New York.

ANSWER: A micron is a unit of measure. One micron unit of length is the thousandth part of one millimeter. When referring to a particle of diameter caught in air conditioning filters, the particle diameter is between 0.01 and 0.0001 millimeter.—J.M.M., San Luis Obispo, Cal.

Wants Simple V-Belt Care

QUESTION NO. 1128: What are some rules of thumb for the care of compressor v-belts? M.E.Q., Boston.

ANSWER: Belt tension must be correct; neither too tight nor too loose. Strike belts with the edge of the hand. You should feel them give but they should snap taut again.

Do not mix old and new belts on multiple-belt sheaves. Change all belts together when they are worn.

To mount them, slack off the tension adjustment. Put them on by hand. Do not pry them over one another with screwdrivers or similar tools.

Keep oil and grease off.

Order more spares.—A.M.E., Chicago.

New Questions

Need More Humidity

QUESTION NO. 1129: In a building 80x120x12 used by a local meat packing firm we have a refrigeration problem. Please advise how to reach and hold 92 percent humidity.

At present we are able to reach no more than 85 percent humidity without moisture falling to the floor. York air pressure jets are used, but our air water moisture isn't breaking up properly. One 20 hp compressor and one 25 hp compressor handle the cooling by use of a large three-speed blower.—L.A.D., Grand Junction, Colo.

Refrigeration for Ice Making

QUESTION NO. 1130: We desire comparative data as to amount or cost of refrigeration required for one ton each of clear ice and so-called tombstone ice. We cannot find anything in data books on ice manufacture.—H.C.D., Colo. Springs, Colo.

Measuring Odors

QUESTION NO. 1131: Have any systems or instruments for measuring and classifying odors been developed or must we still rely on our noses?—O.R.S., Memphis, Tenn.

Vacuum Gages

QUESTION NO. 1132: On what principle do vacuum gages work? Are the instruments used for measuring moderate vacuums applicable to very high vacuum.—A.C.S., La Crosse, Wisc.

Capillary Tubes

QUESTION NO. 1133: I have observed that smaller packaged air conditioning units are using capillary tubes rather than expansion valves. Do capillary tubes have any particular advantage?—C.E.R., Chicago, Ill.

News Notes and Chapter Activities

Miller Brewing Company Host to Milwaukee NAPRE

Milwaukee—The concluding Spring meeting of the Milwaukee Chapter consisted of a tour of the Milwaukee Brewing Company. Unexpected guest of the evening was Nicholas N. Downes, president of the Chicago Chapter, who announced that the Chicago Chapter was accepting the proposal of Milwaukee's president, Pat Kelly to join in a picnic in the Illinois Dunes State Park near Waukegan.—L. Anderson.

A few members of NAPRE who visited the Miller Brewing Company are shown in photograph above. The chapter had arranged to see the Brewery engine room and power plant in operation. However, it is apparent from this picture that they also enjoyed seeing Bartender Frank Kashuda operate behind the bar in Miller's hospitality center. From left are Clarence Gerds, power plant supervisor at Miller; Richard Mallinger, maintenance manager; Nicholas Downes, president of the Chicago chapter, NAPRE; Peter Luljack, refrigeration and air conditioning supervisor at Miller, and Leland Anderson, Milwaukee NAPRE secretary.

Tampa Chapter Shifts Meeting Date

Tampa, Fla.,—This chapter voted at an early July meeting to shift its meeting nights from Thursday to Monday evenings. At the same meeting the nominating committee submitted a list of members as proposed candidates for office. They are Robert T. Seiden, president; Joe Bustelo, 1st vice-president; Russell Kraiker, 2nd vice-president; Merle L. O'Berry, treasurer; Martin R. Smith, secretary; Richard D. Small, sgt.-at-arms and C. Scott Johnson, chairman, educational committee.

The chapter has written several more manufacturers requesting catalogs and bulletins, including a request for the loan of a film by the Crane Co. A Solvay calcium chloride bulletin was distributed to all members during the July meeting. The chapter has also embarked on a mail campaign, circulating 200 letters and brochures describing NAPRE and Tampa Chapter activities to the industries in this area.

G. L. Carter of the Chapter's educational committe attended the apprenticeship council in Biloxi, Miss., and brought back several ideas that the chapter can use. Instructor Rhodes conducted the question box and even reversed the table on the members in attendance by giving them a problem for a change.—Martin Smith.

Operating, Servicing, V-Belts Louisiana Topics

NEW ORLEANS—Another session on "Operating" was presented to Louisiana No. 2 Chapter by Instructor Thomas Stokes on May 9, 1956. This was the second in a series on "Operating".

On May 18 a plant visit was conducted to the Louisiana Light and Power plant in Algiers, La., across the river from New Orleans. It was a very interesting tour and was well conducted. Over 100 members were on hand.

On June 13, in the Roosevelt Hotel at our regular Wednesday meeting, Prof. Stokes discussed Chapter 15, Section 8 of the Guy King lecture course entitled "Servicing". This topic seemed to bring a lot of questions from the floor and they were well handled by Prof. Stokes. Following Prof. Stokes lecture, a film provided by the Allis-Chalmers Co. depicted "The Theory and Principles of V-Belt Drives". Mr. Muller, manager of the local Allis-Chalmers office, discussed this film and answered many questions.

On June 27, at a regular meeting which was nearly rained out, Prof. Stokes discussed Chapter 16, "Refrigerated Enclosures". Many favorable comments were noted on the last lectures and chapter officers are hoping the interest continues. These interesting features are presented by Educational Chairman, Marian Olivier.

New Orleans President Damian Fischer is pleased with the way delinquents are paying their dues and that many new members have come into the chapter. The local group in New Orleans is starting to make plans for the National Convention in Detroit.—JOHN MARIAKIS.

Miami Continues Classes Through Summer Months

Miami Beach—Greater Dade County Chapter, NAPRE, continues to meet every 2nd and 4th Wednesday for their refrigeration classes. From the way the instructions are received by the membership and the apparent satisfaction expressed by themselves in attendance, the chapter is making pretty good progress in this department.

Charles Haller, presdient of the chapter, took our national president Leroy Etzel's suggestion that all chapters continue their membership drive among air conditioning engineers. The chapter had a letter planographed over Haller's signature and circulated to the management of all hotels, institutions and office buildings in Greater Dade County. As the managers provided names of their engineers the secretary of the chapter corresponded with them and extended an invitation to attend our refrigeration classes and meetings. The response has been very favorable and the chapter is pleased to announce two new members, Henry J. Domek, North Miami Beach, and Dewey L. Lock of Orlando.

With the letter to prospective members the secretary enclosed a card about the size of a national membership card, with the association seal, and a statement showing how often the chapter meets and where it meets. Instructions are on the card with regard to locating the meeting room and where to park if the prospect should drive. This little gadget we find has been very helpful in steering prospects to the meeting.

One of the newer objectives of the Greater Dade County chapter is to compete with Tampa in bringing the national convention to the State of Florida in 1958. Representatives of the Miami Beach Convention Bureau have already met with chapter officers. A plan of action is being mapped.—Charles Moneypenny.

Evaporators Topic at Colton

San Bernardino—California Chapter No. at Colton held its regular meeting early in July. The refrigeration class was lectured to by Instructor Frank J. Scherer on evaporators. Different types of evaporative services was dscussed and the advantages and disadvantages for various applications were described. Several questions were brought up from the floor and even a couple of problems were worked out there, during Frank's chalk talk. Following the business session, members enjoyed slide pictures by C. H. Purkiss of the vacation trip he and Mrs. Purkiss made through the East. Pictures included

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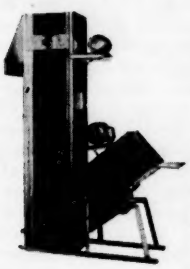
One man can keep unit in operation bagging and loading magazine.



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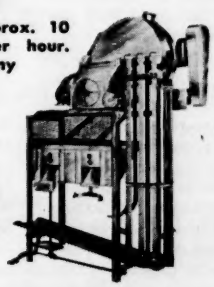

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shots of the Arizona Desert, the Alamo in San Antonio, Mississippi River, New Orleans, St. Augustine, Fla., Chicago, Ill., and Washington, D.C. The usual lunch was enjoyed by all who attended this meeting at the Santa Fe ice plant in San Bernardino.—Harry Bonter.

Oklahoma Members Vacation

Tulsa—Chapter meetings and refrigeration classes have been suspended at Tulsa for the two hot summer months. Members would rather relax after some trying days in the plant. Therefore, Tulsa scheduled two socials, one for July and the other for August. On July 12, the chapter held its annual beer party at the home of Bob Palmer. Members and guests relaxed in croquet games and horseshoe pitching contests. A few card sharks got off to the side for a game of their own.

The fried chicken and ham was ample and the liquid refreshments were in profusion. Past National President, George Hughes and Lawrence Wagner turned out to be the champion croquet players. Louis Green and Alden Sellers of Beatrice Foods Co., guests, turned out to be the handiest engineers with the horseshoes. With the exception of possibly a couple of losers in the card game, everyone seemed to enjoy themselves. To prevent any differences of opinion as to the rules of croquet, a set of rules was drawn up and adopted before the match. To focus interest on the social, the rules were mailed with the meeting notice, believed by members around here to be an innovation in itself.—Bill Swadley.

Bill Waters Passes

Los Angeles—The chapter suffered the loss of Bill Waters who died last month. Bill had been a member of NAPRE since 1935. He started work in the refrigeration field in 1930 when he went to work for California Consumers Corporation as a maintenance helper. He advanced to maintenance mechanic, operating engineer, and finally to Assistant Plant Chief Engineer of the Merchants Plant of California Consumers Corporation.

Mr. Waters was stricken with Leukemia, which progressed so rapidly that in spite of the fact that he elected to retire two years before the regular age of 65, he died before he received his first pension check. Bill was survivied by his wife Catherine.—Fred Herr

Mid-South Recesses

Memphis—July meeting of Tennessee Chapter No. 1, consisted of a round table discussion on various articles which appeared in the July issue of Industrial Refrigeration. The chapter does not schedule regular refrigeration classes during the warm summer months as the attendance is erratic. Following this round table discussion President J. H. Robinson showed the members a picture on the design, fabrication and erection of the Golden Gate Bridge at San Francisco. A number of useful engineer's tools, plastic water hose and other items were awarded to members in attendance. The firms in the Memphis area donate gifts of this nature to the chapter in order to encourage attendance of members when the mercury is high.—Chas. Conley

Member-at-Large Writes Book—Another Heads Institute

New Orleans—Foreign members-at-large in NAPRE often hold some very distinguished positions and engage in some very interesting enterprises and occupations. Other members may be interested in the activities of Naranjan Singh Chadha who has been a member for a number of years. Also prominent among our members-at-large in countries abroad is J. L. Gichard. Both have recently corresponded on their country's activities, resumes of which are given here:

Indian Member Writes Book

Chief Engineer and Manager, C R Cold Storage and Ice Factory, Agra-U.P. India, Naranjan Singh Chadha, member-at-large, requests data that our national office may have on ice and ice manufacturing. Chadha and his associate Shia B. R. MaChetna of Delhi University, are writing a book on ice and ice making for their countrymen. Any members who have text books, reprints of technical papers or other data on this topic can help this member-at-large greatly if they will forward the material to our national office. Our national staff will collect such data and send it on to friend Chadha with the hope that he can use it.

This member-at-large had requested all back issues of the Operating Data Book which he had not received, some 10 to 12 issues. Unfortunately our stock is exhausted on these back issues and we are unable to supply them. If any members have some back issues which they would like to send this member-at-large, the national office and the member himself will be most grateful. He also requested permission to quote from certain articles in the data book. As our annual yearbook is copyrighted he had to seek this permission which was gladly given based on his agreement to credit the source of all material and the Operating Data Book itself.

Mr. Chadha also communicated a little information on his cold storage plant. The structure is multipurpose and although it is being used at present for preserving one thousand tons of table and seed potatoes, it has been used at various times to successfully store such commodities as oranges, apples, fish, butter and eggs. Chadha describes the plant as consisting of two main cold storage rooms each 80 x 40 x 22 feet and one precooling chamber of the same size. He commented that the precooling chamber has an open veranda attached which is utilized as a sorting place and is occupied on one end by the mechine room and ice plant. The ice plant production per day is 20 tons.

Details Plant Equipment

The plant consists of three ammonia compressors of the enclosed vertical high speed single-acting type with V-belt drive and the usual discharge, suction, relief and bypass valves. Electric motors driving these compressors are slip-ring wound-rotor type, open, each rated at 40 hp and using 3-phase, 50-cycle, 400 volt supply. Their speed is 1430 rpm.

The two cold storage rooms employ floor-mounted type cold air diffusers each being complete with fan section, V-belt drive, motor, etc. Only one such unit is used in the pre-cooling room. One room is equipped with humidifying gear. The rooms are also equipped with exhaust fans for venting CO_2 when fresh fruits are stored.

The brine tank for the ice plant is approximately 54 x 14 ft. by 4 ft. deep, all steel. The coil for the brine tank is of special design while the brine agitator is of the horizontal type, and the system is equipped with two brine pumps. The brine cooler is shell and tube as are the condensers, being of horizontal type 24 inches in diameter by 16 foot. The receiver is also 24 inches in diameter but only 12 foot long. The condensing water pump is a centrifugal with over-size 20 hp electric motor. The condenser water cooling is by means of an atmospheric cooling tower.

Chadha in addition to his duties at the cold store and his author ambitions, acts as refrigeration consultant to 5 other cold storages in India and is the author of an article on refrigeration of fruits and vegetables native to India, as well as one on development of the cold storage for perishables in his country.

New Zealander Heads Institute of Refrigeration Engineers

Member J. L. Gichard is president of the New Zealand Institute of Refrigeration Engineers. He is a registered consulting engineer, specializing in all tpes of commercial and industrial refrigeration. During World War II he was a controller of all refrigeration in New Zealand and was closely associated with the U. S. Armed Forces with regard to the food supply of our forces which was drawn from New Zealand. Gichard writes that it is several years since he was last in the United States and he does not anticipate another visit at present. His correspondence indicated that they have developed some techniques of their own in the refrigerating field, applying it to their particular requirements and that he would endeavor to send the association several articles which might be of interest to NAPRE members. NAPRE welcomes this type of correspondence and looks forward to some very interesting reports from member Gichard.

Mobile Chapter Prospects Contacted

More activity has taken place in the Mobile, Alabama vicinity with regard to forming an NAPRE chapter. Gordon C.

Wiggins of the Carloss Well Supply Company in Memphis recently furnished a list of 13 refrigerating engineers in public buildings, ice, meat packing and bottling companies who have evidenced an interest in NAPRE. NAPRE's 2nd vice-president and membership committee promptly went to work on these potential members. Invitations have also been extended to these gentlemen to attend some of the Fall meetings of Louisiana Chapter No. 2 at New Orleans. The thanks of the Association goes to Wiggins for his interest and efforts in behalf of an NAPRE chapter at Mobile.—Frank Chase.

Chicago Hotel Extends Air Conditioning

THE Bismarck Hotel, Chicago, will be air conditioned in a modernization program to cost more than a million dollars according to announcement by Arthur M. Wirtz, president and Otto K. Eitel, manager. Both winter and summer air conditioning of all the hotel's 600 guest rooms will be provided, thermostatically controlled. East guest will have individual control by adjusting a simple thermostat to raise or lower the temperature according to his own personal preference. The cooling and heating supplied automatically to each room will be entirely draft free and the noise level of the entire system will be so low that it will be inaudible to the average ear.

Work of installing the system has already started and the initial heating phase will be completed by October 1. The hotel presently has about 20 percent of its guest rooms air conditioned. The new air conditioning system is scheduled for completion April 1, 1957. All of the hotel's public dining rooms, bars, private dining rooms, ball rooms and lobbies are already supplied with air conditioning.

Revised Standards For Air Conditioning

PUBLICATION of a revised ARI Application Engineering Standard (610-56) for Year-Round Residential Air-Conditioning, is announced by the Air-Conditioning and Refrigeration Institute. The new standard specifies minimum application engineering standards for year-round residential air-conditioning systems with refrigeration and warm air heating, and includes a one-page form for estimating cooling load on residential installations, the first such form to be made available for estimating residential load.

Inclusion of the form, which enables contractors to arrive at a close estimate of the design load for individual residences, is one of the major revisions. Another is the inclusion of a roof-overhang factor in calculating shaded and unshaded areas of windows as a step in arriving at the estimated cooling load, and a third is a revision of the table covering "Design Outside Conditions" in all parts of the continental United States, ranging from winter temperatures as low as minus 35 F at Williston, North Dakota, to summer dry bulb temperatures of 115 F at Needles, California.

At the same time, ARI has announced that it is making available extra copies of the cooling load estimate form in pads of 50 forms, for use by contractors and others estimating cooling loads in specific residences. The forms may be purchased from ARI at $1.00 per pad of 50. The revised Standard 610 is available from the Institute at 50 cents per copy.

The Standard was prepared under the direction of the Engineering Committee of the Year-Round Residential Air-Conditioning Section of ARI, headed by James O. Yund, chief applications engineer, Air Conditioning Division of Servel, Inc.

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National Ice Annual Convention in Atlanta

THE annual convention of the National Association of Ice Industries will be held this year in Atlanta, Georgia, at the Biltmore Hotel, November 13-16. The Biltmore, located in a beautiful four-acre park, is equidistant from all railroad stations, has airport limousine service to the door and convenient adjoining car parking facilities. It also has one of the finest exhibit halls and convention layouts.

An interesting, realistic, and informative program is now in the making. Money-making ideas will be funneled into the business sessions. A complete exhibit is planned of new supplies and equipment. For entertainment there will be the usual dinner-dance and floor show.

Advertising Exhibit at National Ice Convention

AN assortment of the best advertising material in current use by members of the ice industry will be shown in a special exhibit at the annual convention of the National Association of Ice Industries. At a recent meeting the Sales and Marketing Committee of the Association came to the conclusion that there is an opportunity for ice companies to make more effective use of local advertising and promotion. This resulted in making plans for the special exhibit of material actually used by ice concerns.

Those who have used advertising material, newspaper, folder, stuffer, banner, direct mail, a novelty item, or anything used for local advertising and promotion of the ice business are requested to send two samples to the National Ice Association to be included in the exhibit. It is pointed out that a good display will be not only an excellent way to exchange ideas but it will also serve to stimulate interest in a more aggresive promotional program throughout the industry.

New Los Angeles Warehouse

A NEW three-story reinforced concrete storage building is being erected for the National Ice and Cold Storage Company at 814 Turner Street, Los Angeles. Designed by S. B. Barnes of 2234 Beverly Boulevard, Los Angeles, the project will cover an area of 80 x 38 feet, and will include a concrete loading dock. No information as to cost of the project is yet available.

New Cold Storage House For Connecticut Valley

SAID TO BE the largest refrigerated warehouse in the Hartford area, in the heart of the rich Connecticut Valley market, will be opened this month by the Hartford Freezer Corporation.

Located on Park Avenue in East Hartford with a four-car siding on the New Haven Railroad, the new plant will have a capacity of one million cubic feet all on one level. The first public cold storage facility to be built in the region in a half-century, the completely palletized warehouse is claimed to be the most modern in Southern New England.

Huburt M. Arons

Heading Hartford Freezer are Herbert Savin, president, of the Savin Construction Company, and Hubert M. Arons, vice president and general manager, frozen foods pioneer who has been associated with First National Stores as buyer of frozen foods and commodities for the East Hartford Division.

In addition to the New Haven Railroad siding, alongside an enclosed receiving platform, the Hartford Freezer warehouse will have a protected loading platform accommodating 11 trucks simultaneously with ample space for maneuvering. All arteries serving New England and the metropolitan markets are directly accessible.

The new plant covers 50,000 square feet and will be able to accommodate 15,000,000 pounds. Reserve areas have been planned for expansion, Mr. Arons said.

The construction of Hartford Freezer's cold storage and quick freezing center follows a nationwide study of modern warehouses. Initial response of major food distributors has been most gratifying, Mr. Arons said, and demonstrates the Hartford area's long need for such a key facility.

At First National Mr. Arons was responsible for the establishment of one of the nation's first chain store systems for the distribution of frozen foods. It is his opinion that even with its great consumer acceptance in recent years the frozen food industry has yet to enjoy its most important growth.

Canadian Warehousemen Hold Annual Convention

THE CANADIAN Warehousemen's Association at its 36th annual convention at Digby Pines, Nova Scotia elected Ernest P. Carr, Howell Warehouses Ltd. Toronto, President.

One of the best attended conventions in the association's history, delegates came from as far afield as California and England. The convention theme, Keeping Pace With Canada, was the central note in the discussions and addresses, which featured many industry leaders from Canada and the United States. Retiring president, W. Dennis Day, Toronto, stated that the public warehousing industry is keeping pace with the dynamic rate of progress in this country, through its constant alertness to the needs of its customers. The association's managing director, H. Cecil Rhodes, reported that the CWA has forged ahead rapidly in membership growth and services, with a 25 percent gain in membership during the past year and a half.

The refrigerated and merchandise storage divisions under the chairmanship of J.R.A. Langs, Hamilton and George Verral, Toronto, gave considerable attention to newer technical developments.

Ice Company Provides Food Display For Restaurants

A SMALL portable, stainless steel case for display of steaks, seafoods, etc. on ice in restaurants was a part of an attractive exhibit presented by Rainier Ice & Cold Storage Company of Seattle at the Pacific Northwest Restaurant Convention. The case was filled with sparkling Ice. It provided an elegant background for steaks or seafood displays. The display could be exhibited in the restaurant or as a window display.

The case is 18 × 30 in. The front is about 5 inches deep and the back is about 8 inches. It is insulated with one inch of insulation. Rainier has the cases built locally and they sell them to the restaurant or they will rent them on a monthly basis. The unit provides an attractive display for the wares of the eating establishment, and they keep the iceman doing business with the owner!

TRRF in New Building

ON AUGUST 1st, The Refrigeration Research Foundation was officially located at its new headquarters at 12 North Meade Avenue, Colorado Springs, Colo. The building, designed by Bunts, Kelsey and Bunts of Colorado Springs, is a very attractive semi-modernistic one-story structure of red brick and Travertine Marble, with grey-green trim and a yellow door.

Its main feature is the top-rated fire-proof vault library in which will be housed the invaluable research records of the Foundation, including Director H. C. Diehl's personal collection. There are also an attractive entrance room and two offices on the first floor. In the basement is a work and storage room, the rest rooms and the air conditioning and heating equipment.

The project, which came into being during a meeting of the Missouri Valley Chapter in Colorado Springs through a conversation with the-then NARW President, Millard Young, was made possible through the generous action of William J. Finnegan of Los Angeles, member of the Scientific Advisory Council. Mr. Finnegan loaned $50,000 to the Foundation without interest, to be repaid as monthly rent at $300 per month, with the added provision that should he pass away before the sum is repaid, the building and land would become the property of the Foundation, without further repayment.

Revised Code for Marking Turkeys For Storage

A REVISION in the code for marking classes of turkeys going to storage has been announced by the Institute of American Poultry Industries. The markings were first established two years ago by the Institute, and processors of turkeys were urged to mark all turkey boxes. Storage reports are not satisfactory without a breakdown of sizes and warehouses cannot supply this information unless boxes are marked to show what size turkeys are inside. "The code has been reviewed this year," said Dr. Cliff D. Carpenter, Institute president, "in light of objections to the current letters used, and has been changed."

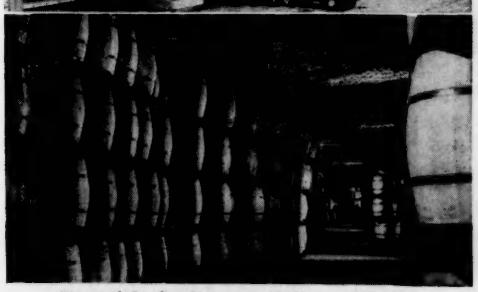
The letters to be used now are "P" for turkeys up to eight pounds; "Z" for turkeys 8 to 16 pounds; "L" for 16 to 22 pounds; "W" for 22 pounds and up; "K" for cut-up turkeys. Each letter is to be stenciled or printed in a circle. In the old code, the letter "R" was used instead of "P" and the letter "U" was used instead of "W". The change is made to avoid confusion with other symbols. The letter "U" in a circle has been used for years by the Union of Orthodox Jewish Congregations to denote to the Jewish consumer that the products bearing this seal are produced under the supervision of this organization and are in complete conformity with the Dietary Laws of the Jewish religion. The letter "R" in a circle is the standard mark used in proximity to names which have been registered as trade marks.

"Every processor who can," said Dr. Carpenter, "is urged to mark all boxes with the new recommended markings. If this is done, the U. S. Department of Agriculture storage report should give us a better picture of the turkey demand and supply situation this fall."

A. H. Eisenmann, director of the Union of Orthodox Jewish Congregations of America, complimented the Institute for its cooperation.

The Natural Storage, near Kansas City, has ultimate space of 10 million cu. ft.

Below: The Inland Storage, at Kansas City, holds contents of 1500 refrigerator cars.



Natural Cooler Storage, Atchison, Kansas, has available 1,500,000 sq. ft.

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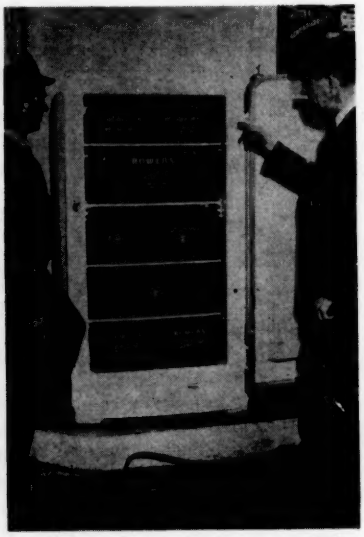
Freezer Keeps Batteries Fully Charged

Following the suggestion made by several refrigerated warehouse authorities and reported in previous issues of INDUSTRIAL REFRIGERATION, that wet storage batteries offer another storage commodity to maintain their charge and extend their life, the Bowers Battery and Spark Plug Co., Reading, Pa. has come up with the idea of extending this practice to retail outlets by storing their batteries in upright freezers to keep them fully charged until they are delivered to consumers.



A service station operator receiving instructions on how to handle refrigerated automobile batteries.

Holding the batteries in refrigerated storage, Bowers reports, will save dealers a good deal of trouble in handling and costly service at the time of sale. It will also assure complete customer satisfaction since the process virtually guarantees that every battery sold is fully charged when installed.

Storage Conserves Capacity

Batteries stored in a freezer at below 20 F have been found to lose only about 10 per cent of their storage capacity over a period of one year. The low temperature minimizes harmful chemical sulfation on the plates and practically halts self-discharge.

On the other hand, loss of capacity at normal temperatures is quite rapid and highly detrimental. At 70 to 80 F, a battery loses 100 percent of capacity by self-discharge in less than a year, and can no longer be restored to usable condition. A fully charged 1.260 specific gravity battery, for instance, will self-discharge at the rate of .001 specific gravity per day. This battery would thus discharge to 1.230 specific gravity in 30 days.

After this amount of normal loss, the dealer must either recharge the battery or install it in a partially discharged condition.

Cold storage during the summer months, Bowers indicated, should especially save dealers a lot of headaches since batteries self-discharge at a much higher-than-average rate when exposed to the hot sun or plus 80 F heat. Continuous exposure to such temperatures is said to leave a stock battery completely dead in 90 days.

This method of preserving wet storage batteries eliminates the $1.50 to $2.00 extra dry charging cost that is included in the dealer price of every dry charged battery. There is no separate acid to handle, since the electrolyte is already in the wet battery.

Furthermore, a freshly-filled dry charged battery may have less than 75 per cent capacity when installed. It must then depend on the car generator to bring it up to a fully charged state. And sometimes it may never become fully charged if the car is driven a low mileage weekly.

The freezers used in the storage process will hold as many as 14 different size batteries each. As suggested by Bowers, the units should prove particularly useful for storing slow moving batteries or for meeting a sudden quantity demand. For example, the new 12-volt batteries for 1955 and 1956 automobiles are not naturally moving fast. But they must be kept in stock for the time when they are needed.

"By holding batteries in refrigerated storage," said Clarence P. Bowers, president of the company, "dealers will be able to keep them factory-fresh and fully charged. And, when they are sold, the batteries on an average will last the motorist several years longer than they would ordinarily."

The Bowers method of refrigerating batteries is being adopted by automotive service stations, garages and repair shops from coast to coast. The freezer units will be suitable for both indoor and outdoor use.

Cold Storage Increases Tolerance of Dormant Strawberry Plants

COLD storage increases the tolerance of dormant strawberry plants to pest-controlling heat treatment, U. S. Department of Agriculture research shows. Practically all plants stored for two weeks at 32 F. survived 2-minute immersion in water heated to 127 F. This heat treatment is used to free plants of parasitic mematodes and the cyclamen mite.

The value of cold storage in preparing plants for such treatment was demonstrated in extensive tests with Blakemore variety strawberry plants dug during the winter dormant season from a commercial field near Salisbury, Md. Research was conducted by plant pathologists A. C. Goheen and J. R. McGrew and by horticulturist J. B. Smith of USDA's Agricultural Research Service.

Tolerance of dormant plants heat-treated directly from the field was closely related to the air temperature just prior to the time of digging. In all cases, however, heat tolerance was improved by cold storage. Plants dug in late fall and late spring when the mean air temperature was above 40 F. failed to survive the 2-minute hot water immersion. Plants dug in mid-winter, when mean air temperature was below the mid 30's survived the 2-minute treatment.

Other tests in which strawberry plants were heat-treated before and at the end of cold storage further demonstrated the value of cold before heat. These tests also demonstrated that cold storage after heat treatment should be as short as possible. When plants were taken directly from the field, immersed for two minutes in hot water, and placed in cold storage for three and four months, only 40 percent survived. However, when plants were cold-stored for the same period and then treated, 99 percent survived. Of plants placed in cold storage for two weeks, but not treated, 98 percent survived.

The scientists also compared Blakemore with 55 other strawberry varieties to determine the relative heat tolerance of each. Of the 55 only three—Howard 17, Empire and Jumbo—proved less tolerant to the hot water treatment than Blakemore.

Stevens Candy Purchased By Chicago Group

STEVENS Candy Kitchens, Inc., makers of Mrs. Steven's candy, has been sold to a Chicago group headed by Rodney O. Daly. Daly becomes the company's president and chief executive officer. Mrs. Walter A. Krafft, founder of the firm and president since 1921, was named chairman of the board and a consultant. Price of the transaction was not disclosed. The Daly group purchased the company's assets, plant machinery and equipment.

The Stevens candy plant at 611 North Sacramento has one of the largest refrigeration installations for that type of plant, supplying refrigeration for the enrobing rooms, chocolate cooling rooms and storage.

Orange Juice Stocks

AN INCREASE in June in stocks of frozen orange juice of two million gallons brought warehouse stocks up to 42 million gallons. The United States Department of Agriculture reports. This time last year orange concentrate holdings were down two million gallons from the months before to total 37 million gallons.

ASHAE Announces Annual Meeting Dates 1957-60

ANNUAL meeting dates of the American Society of Heating and Air-Conditioning Engineers, scheduled for the next four years by the Council of the Society are announced as follows by President John W. James, Chicago, Ill.:

63rd Annual Meeting, Chicago, Ill., February 25-28, 1957

64th Annual Meeting, Pittsburgh, Pa., January 27-29, 1958

65th Annual Meeting, Philadelphia, Pa., January 26-29, 1959

66th Annual Meeting, Dallas, Tex., February 1-4, 1960

It is further announced by Mr. James that three Heating and Air-Conditioning Expositions, under the auspices of the American Society of Heating and Air-Conditioning Engineers, have been approved as follows:

13th International Heating and Air-Conditioning Exposition, Chicago, Ill., February 25-March 1, 1957

14th International Heating and Air-Conditioning Exposition, Philadelphia, Pa., January 26-30, 1959

2nd Southwest Heating and Air-Conditioning Exposition, Dallas, Tex., February 1-5, 1960

The Expositions will be under the management of the International Heating and Air Conditioning Exposition Co., 480 Lexington Ave., New York 17, N. Y., which has directed all of the Expositions held under Society auspices since their inception in 1930.

Low-Level Radiation For Refrigerated Food Storage

THE FOUNDATION is taking the initiative in getting research started on benefits that may accrue in the refrigeration of foods that have been irradiated at low levels of dosage. Other research has indicated that such benefits may be possible but research is needed with positive objectives in that direction. As everyone knows, other researches in many cases have had other aims and the research that will enable industrial use of low-level dosages with refrigeration must be done with that objective in mind. A project has been planned, to be undertaken by the Department of Food Technology of the University of Illinois, in cooperation with the University of Michigan, and the Argonne Project of AEC. Like all new projects, it requires considerable planning and discussion.—TRRF Bulletin.

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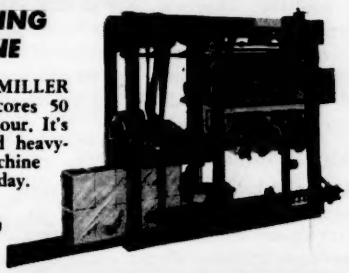

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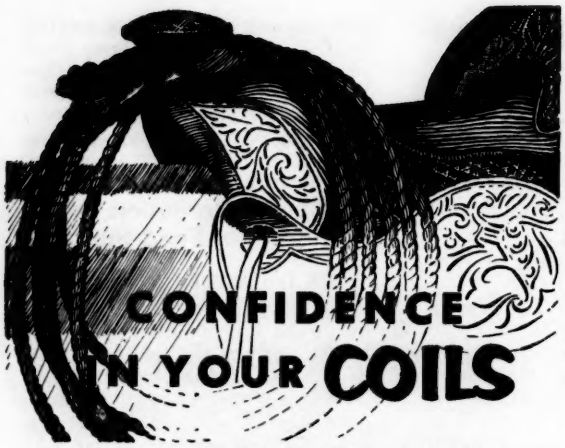

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Whenever you need coils, write for our free tracing-chart which shows standard dimensions ready to fill in. It will simplify your specifications—whether for zig-zag or nested box or conical or round-flat or reducing coils.

NATIONAL PIPE BENDING COMPANY
162 RIVER STREET • NEW HAVEN, CONN.

Established 1883

Refrigerated Reefer Transport Via Ocean Vessels

INCREASED commerce with Alaska including transportation of perishables has grown phenomenally since the conclusion of World War II, and increased again in proportion at the conclusion of the Korean Police Action. However, most transportation lines involved with Alaskan trade have not seen fit to increase refrigerated cargo capacities in their vessels. It has been much simpler for them to adopt piggy-back methods now being used by practically all of the major American railroads. (See Seagoing Refrigerated Trucks Haul Perishable Cargo to Alaskan Ports, INDUSTRIAL REFRIGERATION, September 1954, page 19.)

Alaskan Steamship Company is preparing to announce the construction of a pair of fast vessels for their Alaskan trade which will be rather radical in design compared with their present vessels of World War II vintage. These new vessels in the blueprint stage are planned as roll-on, roll-off ships to carry railroad cars and trailer vans. According to this shipping line's executives, the firm began experiments with containerized cargo handling operations in 1949. They expect to reach an almost 100 percent containerized service in a short time with the existing vessels. This trend brought about the design of the two new vessels.

In 1953 the steamship line negotiated an arrangement with a truck line operator providing a door-to-door delivery service from West Coast ports to Alaska, including refrigerated trucks. The vans are 40-foot, 2,000 cubic foot units with an empty weight of about 12,000 pounds. They are specially constructed to permit lifting on and off the vessels, where they comprise a deck cargo. Each ship carries approximately 17 such vans averaging about 55,000 pounds gross.

Loading of the vans for the 1700 mile land and water transportation does not require any special lifting gear other than the ship's heavy lift gear and a small tractor for spotting. However, perishable cargo receives considerable attention. Vans are specially constructed for refrigerated cargo, being insulated completely. Thermo-King refrigeration units are standard equipment in each van, but can be exchanged for a specially designed heater when required.

Sealed Container Service

In conjunction with the Alaskan railroad, Alaskan Steamship Company inaugurated in 1955 a new sealed reefer container service between Seattle and Anchorage, Alaska. A 24-foot, 15 ton capacity steel cargo container equipped with Thermo-King Refrigeration units are carried as deck cargo. These steel containers are carried on weekly sailings of the line.

Advantages to this type container over the conventional reefer van lines is the lack of undercarriage which complicates deck storage with the conventional semi-trailer. The insulated and refrigerated container is transported by means of an especially built rig which operate out of the terminals at each end of the seagoing journey.

Steel containers are confined to company vessels and terminals and not offered for customer loading or forwarded beyond the company's terminals. Shippers desiring door-to-door shipment may load on Alaskan Line's 60 cu ft collapsible wooden cargo cribs which are then transferred to the refrigerated container. Although this operation is highly efficient, taking only 15 minutes by fork lift operation to clear 20 tons of perishables from the cribs to the container, the company visualizes the new roll-on, roll-off vessels as being an improvement over this operation.

Standards for Frozen Fried Fish Sticks

THE U.S. Department of Agriculture has issued Standards for grades of frozen fried fish sticks which apply to rectangular-shaped portions of breaded, pre-cooked, and frozen fish. The standards were recommended by the Fish and Wildlife Service of the U. S. Department of the Interior.

The grades, designated as "U.S. Grade A," "U. S. Grade B," and "Sub-standard," are the first formulated for this product. The quality is evaluated by considering the appearance, degree of freedom from defects, and the character of the product based on a point scoring system.

The standards do not define labeling requirements. Frozen fried fish sticks when sold in interstate commerce must conform with labeling regulations of the Food and Drug Administration, U.S. Department of Health, Education, and Welfare. The standards became effective August 21, 1956. They are substantially the same as those published by USDA in the Federal Register on April 26, 1956.

COMING CONVENTIONS

FLORIDA ICE ASSOCIATION
October 14-16, 1956
Suwannee Hotel, St. Petersburg, Fla.
Muriel Washburn, Exec-Secy.

CANADIAN ASSOCIATION OF ICE INDUSTRIES
October 15-17, 1956
The Chantecler Hotel, Ste. Adele, Quebec
Mrs. Mildred Croft, Secretary

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS, INC.
October 29-November 2, 1956
Statler Hotel, Detroit, Mich.
J. R. Kelahan, Secretary

NATIONAL ASSOCIATION OF ICE INDUSTRIES
November 13-16, 1956
Atlanta Biltmore Hotel, Atlanta, Ga.
Guy W. Jacobs, Secretary

SOUTHWESTERN ICE MANUFACTURERS ASSN.
November 25-27, 1956
Adolphus Hotel, Dallas, Texas
Gen. P. A. Weatherred, Secretary

NATIONAL POWER SHOW
November 26-30, 1956
New York Coliseum, New York

DELTA STATES ICE ASSOCIATION
December 2-4, 1956
Arlington Hotel, Hot Springs, Ark.
Mrs. Edna Vaughan, Secretary

NATIONAL ASSOCIATION FROZEN FOOD PACKERS
January 6-10, 1957
Fountainbleau - Eden Roc Hotels, Miami Beach, Fla.
Lawrence S. Martin, Secretary-Manager

INTERNATIONAL HEATING AND AIR CONDITIONING EXPOSITION
February 25 - March 1, 1957
International Amphitheatre, Chicago, Ill.

AMERICAN WAREHOUSEMENS ASSOCIATION
April 1-5, 1957
Chalfonte-Haddon Hotel, Atlantic City, N. J.
Wm. Dalton, Secretary

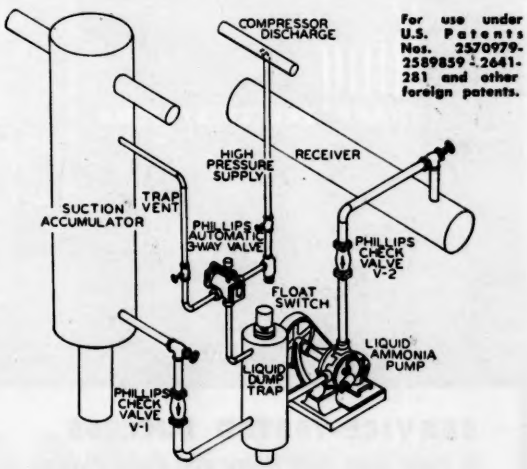
NATIONAL ASSOCIATION REFRIGERATED WAREHOUSES
April 1-5, 1957
Chalfonte-Haddon Hotel, Atlantic City, N. J.
Wm. Dalton, Executive Vice-President

Ammonia "Slop-Over" Handled Automatically by PHILLIPS Liquid Return System

Protects Compressors, Saves Power, Makes Defrosting and Maintenance Simpler

Even in the best designed refrigeration systems, ammonia "slop-over" is a common occurrence. Two stage compression systems, booster systems and control ammonia compression systems subject to fast temperature and pressure changes are especially likely to have liquid in suction lines. This condition can seriously damage compressors which should handle dry gasses only.

Engineers at H. A. Phillips & Co. have devised a system that automatically returns "slop-over" directly to the receiver without regenerating and re-condensing the liquid. As shown in the drawing below, the Phillips Liquid Return System takes liquid ammonia which has collected in the accumulator, drains it through an outlet valve and check valve (V-1) into a liquid trap. Drainage occurs when the trap is at a low pressure. The trap is vented to the accumulator through a three-way valve and vent line. As the trap fills, a float switch is activated, energizing a three-way valve. This valve closes the vent line and connects the compressor discharge to the trap. Pressure builds up in the trap and closes check valve V-1. Pressure in the trap then reaches the same pressure as the receiver, opening check valve V-2 and allowing gravity to carry the liquid to the receiver. If gravity flow is not possible, a liquid ammonia pump is used. High pressure at both the pump inlet and outlet prevents flashing the liquid into gas. When the liquid trap is empty, the three-way valve is de-energized, closing the high pressure line to the trap. The trap is again vented to the accumulator, allowing liquid to drain once again into the trap.



Phillips Liquid Return System

This arrangement is highly efficient since only one pound of compression gas is required to move 25 pounds of liquid. There is practically no loss of refrigeration potential of the recovered liquid. The system also permits oil flushed into the accumulator to be easily drained.

A number of "packaged" variations of this system in capacities to 1000-tons are available to handle all arrangements of accumulator and receiver locations. For full details, write . . .

PHILLIPS

H. A. PHILLIPS & CO.
DESIGNERS AND ENGINEERS
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New Milk Bottling Plant to Use Refrigerated Rooms And Modern Handling Equipment

A NEW milk bottling plant will be built in Camden, N. J. by Supplee Wills Jones Milk Co., distributors of Sealtest dairy products. The plant, to be located at 10th and Fairview Sts., will have an initial storage capacity of 36,000 gallons to provide milk for 84 retail delivery routes and 14 wholesale and store delivery routes in the Camden, South Jersey area. Complete processing facilities and a maintenance garage for the Sealtest truck fleet are planned.

The one-and-two story plant will afford nearly 60,000 sq. ft., including offices and refrigerated store rooms. A steel frame structure with reinforced concrete slabs, it will have brick and aluminum panel exterior. Processing room floors will be quarry tile. Interiors will have glazed tile walls and smooth plaster ceilings. Adjustable vertical aluminum louvres for sun control were specified for office windows in the front of the building.

A Sealtest spokesman added that provision was made for expanding to accommodate an additional 24,000 gallons, when the need arises. The overall building site is 10 acres. All wholesale delivery trucks and trailers will be refrigerated, he said, pointing out that this is in line with the company's policy of adopting the most modern operating methods at new installations.

Floor Space Saving

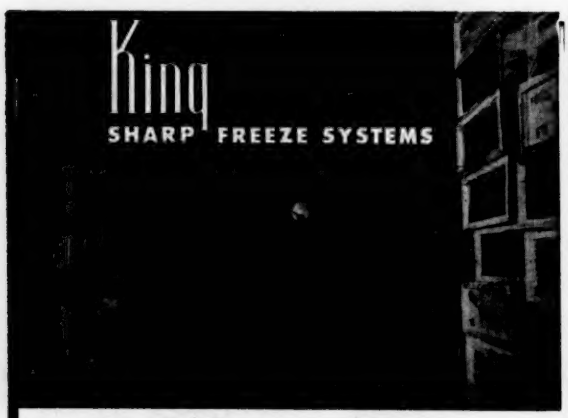
As a floor space saving measure, stainless steel milk storage tanks will be bulkheaded into the pasteurizing room on the second floor, so only the tank faces will be inside the building. Eight tanks will be installed, two of 8000 gal. capacity, two 6000 gal., two 4000 gal., and two 3000 gal. tanks. A special reception hall and facilities for visitors to view the processing operations from behind glass partitions will allow inspection of almost every phase of operations without interfering with work in progress.

Up-to-date materials handling methods are planned for the new plant. Milk arriving in insulated stainless steel tank trucks will be inspected, tested and pumped through stainless steel lines to the refrigerated storage tanks. From here it will go through pasteurizing, homogenizing and cooling equipment prior to bottling. After it is bottled in glass or paper containers the milk will be conveyed to refrigerated rooms and made up into individual orders or loaded directly onto refrigerated trailers. Special conveyors and automatic case stacking equipment will speed the milk on its way to market.

Stack Units

Cases will be handled in stack units instead of case units, cutting handling labor to one-fifth the normal, a materials handling highlight of the new plant operation, the Supplee spokesman said. "We had seen this done in several plants around the country. Using what we saw as a point of departure, we have developed an entire operation based on the stack handling principle," he said. The entire milk processing area will be air conditioned.

The Ballinger Company, Philadelphia architects, designed the new plant, which it is expected will be completed in May, 1957.



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433 N. Waller Ave., Chicago 44.

500 New High-Speed Ice Refrigerated Rail Cars Costing $10.6 Million Ordered by Railway Express

THE purchase of 500 new fifty-ton, high-speed ice refrigerator railroad cars by Railway Express Agency, Inc. at a cost of $10.6 million, was announced recently. Equipped for use in passenger train service, the new express refrigerator cars which will reflect the latest technical and engineering advancements for this type equipment will be capable of operating at speeds up to 100 m.p.h.

Designed and built to the Agency's specifications, the new cars will be manufactured by the General American Transportation Corporation at its East Chicago, Indiana shops. Component parts and materials that will go into the construction of the units will be supplied by about 42 other companies.

To Carry Merchandise

The 500 new cars will bring the Agency's directly-owned "reefer" fleet to about 1500. They will augment the more than 14,000 railroad-owned cars used in express operations in passenger train service. When not in use to transport perishable products in carload refrigerator service, the new cars, which have been planned for maximum flexibility, will carry general merchandise and other dry traffic in regular express service.

The new cars will be of riveted, copper-bearing steel construction and will incorporate modern design with the latest technical and engineering developments for equipment of this type.

Sizes and Capacitors

Sizes (inside) and capacitors will be as follows: Carlength between end lining 49 ft. 11 in.; car width inside lining 8 ft. 3 in.; car height inside floor racks to ceiling 6 ft. 10 in.; door-opening — height 6 ft. 7 in.; door-opening — width 6 ft.; capacity of both ice bunkers 344 cu. ft.; chunk ice 12,900 lbs.; crushed ice 14,800 lbs.; load capacity 2,358 cu. ft.; weight load capacity 65,800 lbs.; car body weight 55,000 lbs.; weight of trucks 25,000 lbs.; total weight of car 80,000 lbs.

Full car insulation will be provided by self-supporting 4-inch blanket-type fiber glass and other materials, specially arranged air spaces in side walls, and a two-side reflective coating of Silvercote as a vapor and temperature barrier. Four-and-one-half inch insulation will be installed in roof and floor of cars.

Six generator-operated overhead electric fans will distribute cool air throughout and equalize car temperatures for maximum refrigerator protection.

Six-foot-wide sliding doors of improved design with double ball bearing rollers and screw-type closure device for airtight sealing and locking to prevent air and dust leakage. The design keynotes greater car accessibility in loading and unloading operations.

Perishable Shipments Increase

In 1955 there were about 8,289 carloads of perishables handled by Railway Express Agency from widespread producing areas to the nation's markets. Some commodities which are handled in "reefer" service by express include shipments of many varieties of fresh fruit and vegetables, fish, meats, ice cream, tomato plants and a number of other diverse commodities. During the last decade the movement of express carload perishables has jumped over 300 percent. Express carloads of fresh fruits, vegetables and other products from the Pacific Coast districts alone destined to market places all over the nation increased from 2,653 cars in 1945 to 7,942 in 1955.

The new cars will be put into service as soon as they are received beginning next summer. They are expected to help expedite the heavy perishable movements which reach a peak during the summer months.

New Technique For Storing Apples

APPLES put to "sleep" by science make better eating, Commerce Commissioner Edward T. Dickinson reported. The proof lies, he said, in more than 700,000 bushels of McIntosh apples that will be brought to market between now and June. They will be available, Dickinson said, because of a new storage technique developed in England and perfected at the State College of Agriculture at Cornell University.

It works this way; The apples harvested in the fall are stacked in sealed rooms, where control of temperature, oxygen and carbon dioxide slow down the "ripening rate". They are still firm and crisp in April and keep longer at room temperature following storage. A report on tests at Cornell says; "It is as though the apples had been 'put to sleep' in storage, and they never fully 'wake up' when brought out into store temperatures."

New Iowa Warehouse

A NEW warehouse with 400,000 cubic feet of refrigerated storage space of which 320,000 cubic feet is freezer, has been built by the Higley Cold Storage Company, Mason City, Iowa. Blast freeze facilities for approximately 45,000 pounds of product per day at temperatures as low as minus 40 F are included. The plant is completely palletized.

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DETROIT ICE MACHINE COMPANY

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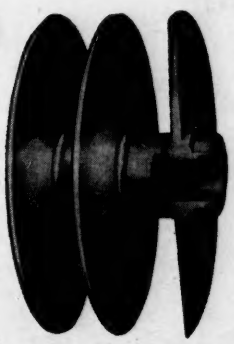

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Hot-Air Engine May Power Air Conditioning

A RETIRED professor from Syracuse University, working in a shop in the basement of his home, is perfecting the hot-air engine, which may be useful for operating a small air conditioner. He is O. A. Carnahan who retired from the University after 27 years as professor of mechanical engineering. He is now working on the engine for the Coleman Company, Wichita, Kansas, manufacturer of gas furnaces.

An article in Popular Science Magazine says that Professor Carnahan has completely re-worked the basic hot-air engine, retaining its simplicity while increasing its adaptability and efficiency. When used for home cooling however it would be simply a power producing device to operate conventional refrigerating machinery.

A typical old style hot-air engine had two cylinders and two pistons. One cylinder was heated at one end and cooled at the other end. The heat expanded air was sent to the second power producing cylinder to drive its piston. As the power piston moved, it caused a loose fitting in the first cylinder to transfer the expanded hot air to the cold end of the cylinder where it cooled and contracted. Then the transfer piston sent the air back to the hot end to expand and start another power cycle. Engines built along these lines were quite widely used about 100 years ago for light jobs. A hot-air engine, like a steam engine, gains in efficiency with increases in pressure.

Builds High Pressure Engine

Professor Carnahan started from these engineering fundamentals and built a modern high pressure engine. His first working model has been quietly chugging away in his shop for months, night and day. It has a single cylinder about a foot high, with a cone-shaped top. Inside is one matching piston that does not fit quite tightly; air can pass around it as it moves. A gas burner sits on top of the cylinder; a water jacket cools the bottom.

The flame heats air in the top of the cylinder, causing it to expand and push the piston down. This compresses the air in the cylinder. Some of the compressed air leaves the cylinder through a port. The rest of the air flows up and around the piston, picking up heat from the cylinder walls which serves as a "regenerator." As the piston starts to rise in the cylinder, hot air from the top flows around the piston to the bottom, losing heat to the cylinder walls. When the air reaches the bottom it is further cooled by the water jacket. So now the air inside the cylinder contracts, and low-pressure air can enter through an intake.

The net result is to convert heat energy from the gas flame into a variation in air pressure in the cylinder. The port in the cylinder is connected by a check valve to either of two tanks. On the pressure stroke of the piston, air goes into the high pressure tank. On the return stroke of the piston, air flows from the low-pressure tank into the cylinder. Another pipe connects the high-pressure tank to a conventional air-operated motor, which does the work that is required to operate the mechanical hookup.

As an air conditioner, the hot-air engine's air motor drives standard refrigeration machinery. The Carnahan engine has yet to operate this way. A prototype is to be disassembled and shipped to the Coleman headquarters. There new versions, each of which may contain several cylinders, will be built to operate experimental air conditioners.

Limestone Caves Serve Minnesota Brewery

TOURISTS visiting Winona Minnesota include the Peter Bub Brewery, Inc., in their lists of sites to be seen. This 93-year old establishment which produces a fine light pilsener for West Wisconsin and Eastern Minnesota distributors, uses limestone caves for their fermenting and storage cellars.

Located at the Foot of Sugar Loaf Mountain — a very startling duplicate of the larger Sugar Loaf Mountain in Rio de Janeiro, Brazil — the brewery took advantage of the naturally cool caves for cellar purposes. The limestone which does not inhibit mould or other growths acts as a natural insulator and little refrigeration is required to hold the cellars at constant temperatures. Modern fin type coils are installed but nowhere in the proportion as will be found in the conventional type brewery construction.

The brewery produces about 30,000 barrels annually and utilizes between 35 to 40 tons of refrigeration capacity. The plant is a Vilter ammonia installation with a large VSA compressor to handle production loads, while a smaller 12-ton compressor is sufficient to keep the cellars cooled.

Dairy Products Repackaged

THE U. S. Department of Agriculture has announced that contracts have been awarded to repackage 6,794,542 pounds of Commodity Credit Corporation-owned dairy products for donation for domestic school lunch, welfare and institutional use. The contracts call for packaging 1,843,200 pounds of butter in 1-pound prints, processing 2,250,000 pounds of cheddar cheese, and packaging 2,701,350 pounds of nonfat dry milk solids.

K. G. Brown Mfg. Co., Inc.
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PRESENTS:

The Most Modern Automatic Ice Cube Vendor.

- **Dispenses Cube, crushed, party and block ice**
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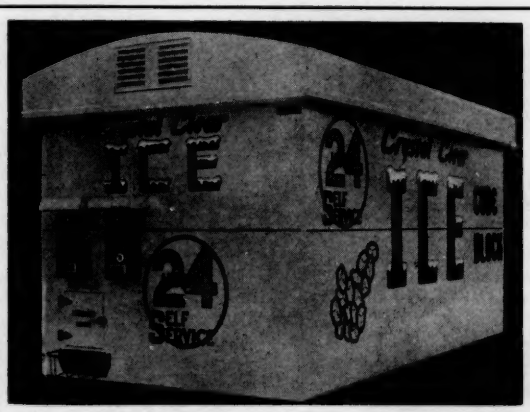


The 8' x 16' station pictured here, vends 135 10-lb. bags & 60 25-lb. blocks

The new low-cost 6' x 8' station vends more than 85 ten-lb. bags.

Write today for complete details on this Double Unit and other sizes and models.

Storing Frozen Eggs

EGGS frozen as whole eggs (whites and yolks mixed) frozen yolks, and frozen whites are equal to fresh eggs for practical home use in leavening and thickening qualities. That was the conclusion reached by Dr. Statie E. Erikson and Miss Ruth E. Boyden, nutritionists in home economics research at the Kentucky Agricultural Experiment Station, University of Kentucky.

They found also that frozen eggs stored six months are as desirable as those frozen six weeks. They reached their decisions as a result of tests made with frozen eggs used in angel food cakes, sponge cakes, butter cakes, and baked custards. However, if frozen eggs are stored in containers that are not satisfactory, their flavor may be impaired.

When glass jars and tin containers were used for storage of whites and yolks mixed, or for egg whites, the eggs could be stored for six months or less and, when thawed, they were as good as fresh eggs. It was noted also that it was easy to remove the desired amount of frozen eggs from such containers. When cardboard containers were used, the flavor of the eggs was slightly less desirable. A further disadvantage was that due to the loss of moisture by the end of six months, egg yolks dried and stuck to the carton, causing some waste. It was more difficult to spoon frozen eggs from cardboard or Cellophane containers than from jars or cans.

In beating frozen yolks, it was possible to get a smooth, creamy mixture from those stored in all containers except cardboard. This was true of eggs stored for a short period as well as six months. The nutritionists found that to freeze and store egg yolks satisfactorily in glass or tin containers for six months, the addition of glycerin, corn syrup or salt was necessary to prevent solidifying. Although glycerin gave slightly better results, corn syrup is effective enough to be used in the home freezing of eggs, they reported, one-fourth teaspoon being used for a dozen egg yolks.

Ice Company Expands

A $37,000 addition of a building and loading dock was registered by the Central Illinois Ice Co., Springfield, Ill. The proposed addition will be located at the plant site.

Frozen Shrimp Research

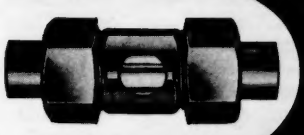
IN THE frozen shrimp research project at Louisiana State University under Dr. E. A. Fieger, procedures for rapid determination of bacterial counts of oysters and shrimp have been developed. One is based on formation of acid by the bacteria in a sample when placed in a standard medium. The other is based on time required for reduction of a dye in a sample added to a milk medium. The reactions occur rapidly and can be measured by changes in color. Dr. Fieger, A. F. Novak and M. E. Bailey plan to conduct work on ice to which has been added a few parts per million of aureomycin (essentially the Acronizing method), and also will work on other control measures for bacteria and on the vitamin content of various species of shrimp.

Tax Amortization Grant

A CERTIFICATE of necessity for accelerated tax amortization for public cold storage warehouse has been issued by The Office of Defense Mobilization to the Parsons Cold Storage Company, Parsons, Kansas. The amount requested was $56,911 of which 55 percent was allowed.

NEW! "250" SERIES LIQUID EYE®
POSITIVE SEALING INDICATORS

designed to save you even more time and money



The new "250" has all the proved Liquid Eye advantages *plus* these newly engineered features:

- **smaller—more compact, simplified design.**
- **preformed copper extension eliminates need for separate gaskets—*foolproof* installation.**
- **complete, self-contained, economy unit.**

Ask your wholesaler now.

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Over 1,000,000 Liquid Eyes Sold to Date!

PERFECT HOST
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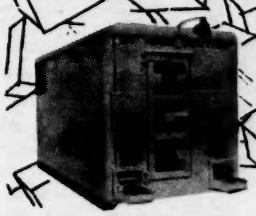

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S & S has really started something . . . soon the whole country will know . . . the only way to become a "perfect host" is to always use ice man's ice (available in almost every U. S. city, from S & S Vending Stations). Free promotion kit containing decals, newspaper mats, releases to food editors, is yours for the asking. If you want to help spark up the sales of party ice, start right now by writing S & S for full details on the big new Perfect Host promotion and on S & S Vending Stations . . . the nation's leader for 28 years.

S & S VENDING MACHINE COMPANY
670 Lincoln Avenue San Jose, California

Aureomycin for Fresh Fish

(Continued from page 20)

of the aureomycin present that the health authorities will give their permission to use this antibiotic for the icing of fish.

For these reasons I would like to stress the importance of further examinations of the destruction of aureomycin by ordinary cooking processes being included in future experiments with aureomycin. If we do not find a solution to this problem we cannot expect the permission of the health authorities to use aureomycin as an additive to ice and may have to look for other ice additives in the future.

Hotel Air Conditions Rooms

(Continued from page 23)

some managers might rightfully take exception to this procedure. The Dyckman's building superintendent commented that in previous buildings where he had worked, monies obtained from the sale of normal amounts of scrap which had accumulated from time to time were reinvested for the employees' welfare. Apparently a certain amount of such funds are turned back into welfare facilities at the Dyckman also for the engineering department exhibited a gleaming new tile shower and washroom.

Survey Shows Trends in Air Conditioning

(Continued from page 3)

an 80-degree effective temperature." Houston, "In the Houston area air conditioning is as much a part of life as heating is in the colder areas." Boston, "The trend is fast in this field, especially in research and development work." New York, "Basic reason for industrial air conditioning is competition for help." Los Angeles, "Trend is snowballing as companies compete for personnel in critical labor market."

Freezing and Cold Storage of Fresh Fish

(Continued from page 21)

as follows: pectinate films, chemical and Irish moss extractive, waxes, edible oils, films and wraps, cellophane, polyethylene, aluminum foil, vinylidene chloride, pliofilm, waxed paper, vinyl-and saran-coated papers, polyethylene-coated paper, polyethylene-coated cellophane.

Protection of Frozen Foods

RECENT projects in the frozen food field at United States Testing Company of Hoboken, N.J. include the following: Development of freezing methods for bakery products; effectiveness of germicides at low temperatures; and microbiology of frozen dessert toppings, vegetables, fruits, and frozen orange and lemon concentrates. Special studies have been conducted to determine evidence of freezer burn on shipments of venison carcasses, the cause of spoilage in frozen oyster stew, and damage to frozen hams.

A precooked frozen fish stick has been developed with consumer evaluation of texture, flavor, and appearance. Effects of storage on quality has been measured chemically and psychometrically.

Microbiological examination of shipments of frozen chicken pies have been made when mechanical breakdown of freezer equipment was claimed. Other examinations have included the sanitation practices in presliced frozen meat plants and in fish plants.

Annual Power Conference

THE 19th annual American Power Conference, sponsored by Illinois Institute of Technology, in cooperation with 14 universities and nine technical societies, will be held at the Hotel Sherman, Chicago, March 27-29, 1957.

The conference, which yearly attracts some 3,000 business and industrial executives, engineers, educators, and government officials, provides a forum for the discussion of problems and exchange of information concerning the electric power industry and associated activities.

The universities cooperating with Illinois Tech in sponsoring the 1957 conference are: Iowa, Iowa State, Michigan State, Northwestern, Purdue, Illinois, Michigan, Minnesota, Wisconsin, Texas A. & M., New York, California Institute of Technology, Georgia Institute of Technology, and Massachusetts Institute of Technology.

New York Corp. Warehouse

A NEW office and warehouse building is being built at 5950 West Touhy Ave. in Niles, Ill., by the York Corp., which operates a warehouse at 1113 West Cornelia Ave. There will be 19,000 square feet of floor area in the new structure.

Wells Will Heat and Cool New Building

A GLASS-and-granite building being built to house the Tacoma Savings & Loan Association will get part of its winter heating and summer cooling from two deep wells under the structure. One of the wells will be 200 feet deep and one 165 feet deep.

In winter months, heat will be extracted from the water, which flows in from one well at 55 degrees and is ejected into the other well at 35 degrees. The remainder of the heat will be extracted from a refrigerant gas which is installed in the heating mechanism. Known as the "reverse cycle" system, the heating system works in reverse as a cooling apparatus in warm weather.

A high velocity air-distribution system, believed to be one of the first of its kind installed in that area, will reduce the size of the ducts used by increasing by three or four times the velocity of the air movement.

The two-story structure will have three sides of cantilevered, double-insulating plate glass, mounted in aluminum framing. Glass doors will be operated electronically. Black granite will be used as outside trim, and marble will be used for interior decorative effects.

Liners Add Refrigerated Space

THE MARYLAND Shipbuilding and Drydock Company has completed the installation of an additional 7,000 cubic feet of chill room refrigerated space on the Grace Line cargo-passenger ships "Santa Sofia," "Santa Monica," and "Santa Clara," operating fortnightly from Baltimore to Venezuela. The new facility is housed in the upper 'tween deck on the port side of each vessel and is accessible by side port as well as from the hatch. Each ship now has a total of over 10,000 cubic feet of refrigerated space for the carriage of either chill room or freezer cargo, an increase of almost 200 percent over that formerly available. Temperature control ranges from 25 F upward.

Warehouse Company Expands

THE Philadelphia Warehousing and Cold Storage Company has purchased "for a sum in excess of $500,000," Miller North Broad Storage Company and Miller North Broad Transit Company of Philadelphia. Three warehouses and a fleet of trucks are included in the transaction.

News of PEOPLE

L.L. (LEW) BAKER, who for the past three years has been manager of the Colorado Ice & Cold Storage Company of Denver, has accepted a position with National Ice & Cold Storage Company of California and has moved to San Francisco. His new assignment will be that of General Superintendent of Sales and Services. Under Lew's direction, Colorado Ice & Cold Storage went through a complete revamping program. The freezing layout was remodeled. New cranes, can fillers and automatic conveyors were installed. The ice processing room was redesigned and equipped with new, modern labor-saving equipment.

T. OTIS ROBERTS, manager of Cold Storage Department, Colorado Ice & Cold Storage Company, Denver, has been promoted to General Manager of the company. Mr. Roberts came to Colorado in 1954 as manager of the Cold Storage Department. Prior to that he was with National Ice and Cold Storage Company of California.

DEATHS

WILLIAM BEN LAMB, former ice company owner at Wagoner, Okla., died July 15 in a Muskogee hospital following a heart attack. He was 69. Mr. Lamb owned the Purity Ice & Bottling Company in Wagoner for many years before retiring a few years ago. After retiring he became a housing developer.

ALEXANDER MOIR, retired vice-president of The Merchants Refrigerating Co. New York, died in a Montclair, N.J. hospital July 22. He began his business career as a clerk for the Harrison Street Cold Storage Company, predecessor of The Merchants Refrigerating in 1898. He served for a time as president of the New York Mercantile Exchange.

RUDOLPH G. KEYTON, Secretary-Treasurer of the Thomasville Ice & Manufacturing Company, Thomasville, Ga., died June 19. Mr. Keyton was a member and had been a director of Georgia Ice Manufacturers Association. He and his two brothers for many years operated the Thomasville and the Crystal Ice Company.

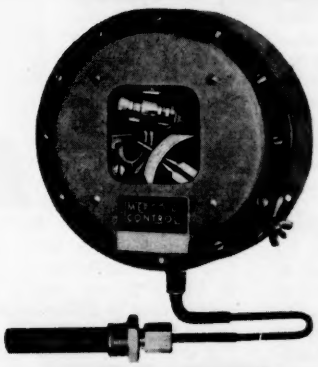
MANUFACTURERS' NEWS

Union Carbide Opens Research Laboratory

WHEN the new research laboratories of the National Carbon Company, a Division of Union Carbide and Carbon Corporation, are in full swing by mid-September in Parma, Ohio, they will have sufficient equipment to operate approximately 1,000 tons of refrigeration.

The boiler and compressor room occupies 84 by 88 feet on the ground floor, with a ceiling height of 30 feet running up through the first floor. Major equipment consists of two natural-gas-fired boilers, with liquid "Pyrofax" standby, and two 400-ton refrigeration units. These units, together with a half dozen others in various areas, provide the 1,000 tons of refrigeration.

REMOTE BULB TEMPERATURE CONTROLS



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Chilled water from the refrigeration units is pumped through heat exchange coils in a number of air supply units located in various "penthouses" on the roof of the laboratories. From those supplying the laboratory areas, 750 cubic-feet-per-minute of electronic filtered air at 58 F. is delivered to each one of the 158, 12 by 24 feet modules. This air is warmed as needed by a thermostat-controlled reheat coil in each module and is then exhausted to the outdoors without any recirculation.

This makes it possible to use toxic chemicals in any module and, in such cases, the air is exhausted through a hood rather than a ceiling fixture. In other air supply systems, which supply the cafeteria, auditorium and office areas, a reasonable recirculation of conditioned air is provided.

Other air conditioning systems in the laboratories are used for specific purposes, such as one that supplies the modules where electrical brush testing is conducted. An entirely independent system, it is a 24-hour operation with air not only electrically filtered, but maintained at a constant humidity of 50 percent and vapor-filtered through a bed of activated carbon. Another system supplies 24-hour constant temperature and constant humidity to a battery testing area and still another supplies around-the-clock low humidity to an area where infra-red measuring devices are subject to deterioration at high moisture levels.

The new laboratories, which will be officially dedicated September 18, contain approximately 175,000 square feet of floor space and are located near the center of a 126-acre plot on Snow Road in suburban Cleveland.

Designed for extreme flexibility, with provisions for expansion, the main laboratory building consists of 158 laboratory modules, or individual research units, fully equipped with all the usual service lines and, in addition, unusual features such as lines distributing rare gases.

Harry Klingler 20 Years With Kramer Trenton

Harry Klinger

HARRY KLINGLER, Philadelphia area sales representative for the Kramer Trenton Company, Trenton, N.J. celebrated his 20th year as a salesman for Kramer in July. A native of Philadelphia, Klingler joined the Kramer Trenton Company in 1956. Previously he was associated with the Merchant & Evans Company, of Philadelphia; the Baltimore Tube Company; the Fretz Brass & Copper Company; and the Melchior, Armstrong and Dessau Company, of Philadelphia. He is active in the American Society of Refrigeration Engineers and served as Philadelphia section chairman of the ASRE. He is also a member of the Electrical Refrigeration Association of Philadelphia and served as president of the group for 10 years.

Refrigerant Numbering System Offered by DuPont

THE Du Pont Company has offered to make generally available a simplified numbering system developed over the last quarter century to identify chemical compounds used as refrigerants.

Acceptance of the proposal, made initially to The American Society of Refrigerating Engineers, would eliminate confusion existing in the refrigeration industry due to similarity of fluorinated halohydrocarbon refrigerants. A common numbering system not only would simplify equipment designers' and manufacturers' work but would greatly assist refrigeration servicemen in identifying and using the proper cooling agent in repair work, regardless of the source of the material.

The proposal already has been accepted by the Standards Committee and Council of The American Socety of Refrigerating Engineers and will be incorporated into an ASRE Standard on Refrigerant Designation for approval by the general membership of the scientific group in the near future.

Specifically, Du Pont has announced that it will not look upon use by the refrigerants industry of the generic term "refrigerant" followed by code numbers base don Du Pont's numbering system to constitute infringement of its trademarks. Such trademarks consist of a combination of "Freon" or the letter "F" with such numbers, as in the case of "Freon-11", "F-11", "Freon-22", "F-22", etc. However, the announcement made it clear that Du Pont reserves to itself the exclusive use of its trademarks.

The numbering system, based upon the chemical structure of compounds used as refrigerants, was first developed by "Kinetic" Chemicals, Inc., then a jointly owned subsidiary of Du Pont and General Motors Corporation, in 1930. The first of a family of "Freon" fluorinated or halohydrocarbon compounds had just been introduced to replace more toxic, flammable, or explosive chemicals then used as cooling agents. Refrigerants of the type of "Freon" are credited with making mechanical refrigerators, freezers, and air conditioning systems completely practical from a public safety standpoint, and are used today in nearly all home cooling equipment as well as a sizeable portion of commercial and industrial refrigeration and air conditioning systems.

From 1930 until 1952, "Kinetic" Chemicals, which became a division of Du Pont's Organic Chemicals Department in 1950, was the only U. S. manufacturer of fluorinated hydrocarbon refrigerants. In the early 1950's the General Chemical Division of Allied Chemical and Dye Corporation entered this field with "Genetron" fluorinated hydrocarbon products. Pennsylvania Salt Manufacturing Company has announced it will introduce later this year a third brand of fluorinated hydrocarbon compounds under the trademark "Isotron".

In making this offer of its numbering system to The American Society of Refrigerating Engineers, R. J. Thompson, director of sales of the Du Pont Company's Kinetic Chemicals Division, observed that an ASRE Task Committee has been studying the problem of designation of refrigerants for the last several years in order to avoid the problems created for users and equipment manufacturers if refrigerant manufacturers adhered to or adopted different numbering systems.

Mr. Thompson expressed the hope that Du Pont's proposal would eliminate presently existing confusion and would be beneficial to the whole refrigeration industry.

Carrier Appoints Anderson

Philip P. Anderson

THE appointment of Dr. Philip P. Anderson as director of development in absorption refrigeration has been announced by Walter A. Grant, vice president of Carrier Corporation's central Research and Development Division. He will be responsible for the absorption refrigeration program now underway in the division.

A native of Calvert, Texas, Dr. Anderson attended the University of Texas, receiving his doctorate in physical chemistry in 1936. He comes to Carrier after 20 years with Servel, Inc., Evansville, Indiana, where his most recent position was director of advanced engineering. During his last 15 years with Servel Dr. Anderson has been associated with all phases of research and development of air conditioning for residences and small commercial establishments. He is a member of the American Society of Refrigeration Engineers and the American Chemical Society.

York Names Werden District Manager

Robert G. Werden

THE appointment of Robert G. Werden, North Atlantic District Manager of the York Corporation, has been announced by Ray K. Serfass, vice-president and general manager of the Industrial Division. Mr. Werden, who will have his offices in New York City, has been industrial sales manager of York's Middle Atlantic District with headquarters in Philadelphia for the past ten years.

A graduate of Lehigh University, where he received his engineering degree in 1937, Mr. Werden has been with the York Corporation for 19 years. A registered professional engineer in the state of Pennsylvania, he is a former chairman of the Philadelphia section of the American Society of Refrigerating Engineers and is presently a director-elect of the national society. He is also a member of the American Society of Heating and Air Conditioning Engineers and the Sales Managers' Association of Philadelphia.

Stauder Heads Refrigeration Sales for Creamery

Oscar F. Stauder

OSCAR F. STAUDER has been promoted to sales manager of the Refrigeration Division of The Creamery Package Mfg. Company, Chicago, according to an announcement from the firm's vice president, J. L. Brazee. Mr. Stauder is a mechanical engineering graduate from the University of Illinois. He joined Creamery Package in 1952 following many years of field experience in refrigeration applications. His background includes refrigeration engineering for dairies, ice cream hardening tunnels, bakeries, chemical plants, skating and curling rinks, food freezing tunnels and cold storage plants.

Armour Ammonia Division Advances Lambur

John L. Lambur

JOHN L. LAMBUR has been appointed sales supervisor of jobbers and agents for the Ammonia Division of Armour and Company, R. S. Passmore, Division manager, announces. Mr. Lambur, who will be headquartered in Chicago, was formerly district representative at St. Louis where he joined Armour in May, 1955. Previously he was regional sales manager for Ozark Airlines.

DuPont Opens New Plant For "Freon" in Brazil

THE wholly owned subsidiary of E. I. du Pont de Nemours & Co., Du Pont do Brazil Industrias Quimicas, will begin manufacture of "Freon" refrigerants and aerosol propellents early next year at a new plant near Barra Mansa in the state of Rio de Janeiro, South America. Although cost of the new facilities was not disclosed, the Brazilian firm said initial production capacity would be in excess of Brazil's requirements for the fluorinated hydrocarbon compounds over the next five years. The plant, to be constructed on the site of the company's present Goiabal plant on the Presidente Dutra highway, was designed in Brazil around equipment and material available locally. Brazilian firms, the company said, will manufacture more than 90 per cent of the plant equipment, while construction materials will be entirely of Brazilian origin.

Brazilian production of the fluorinated hydrocarbons will result in a substantial saving in foreign exchange for the South American country, the company explained. Until this time, all of the "Freon" compounds sold in Brazil have been imported from the United States.

Barnes Accepts New Post

Charles A. Barnes

CHARLES A. BARNES, assistant secretary and assistant treasurer of the York Corporation, prior to its merger with the Borg-Warner Corporation, has been promoted to assistant to Albert Steg, financial vice-president and treasurer of Borg-Warner, at their headquarters in Chicago, Illinois. Announcement of this promotion was made by S. E. Lauer, president and chief executive officer of Borg-Warner's York Division.

Prior to his promotion, Mr. Barnes served as assistant secretary and assistant treasurer of the York Corporation for a period of five years. He joined Yorkco in 1940 after graduating from Ursinus College with an A.B degree. He majored in business administration and pre-law, and completed a course in those subjects at the Navy Supply Course School of the Graduate School of Business Administration, Harvard University.

Except for a period of about two years in military service during World War II Mr. Barnes' employment with Yorkco was continuous since his graduation.

CP Exhibit at Dairy Show

A LARGE exhibit will again be shown by The Creamery Package Mfg. Company at the Dairy Industries Exposition at the International Amphitheatre, Chicago, October 6 to 13. CP's Booth C-1 will occupy approximately 6,000 square feet of floor space on the boardwalk level of the Convention Hall.

Stressing the Creamery Package sales story "The Extra Benefits of CP Equipment", the booth will feature a complete Vac-Heat product treating process, the latest in CP homogenizers, the new CP MilKeeper bulk farm cooling tank, a CP No. 100 Bottle Filler for rectangular 2 qt. operation, a Bantam Jug bottle washer, a CP Multi-Process tank with a dry ingredients hopper attached, the CP Mix'N Flavor blender, several stainless steel sanitary centrifugal pumps, and a 10 cylinder "K" ammonia booster.

A compact Heavy Products Heat Exchanger will be displayed for the first time and in addition, CP will show the newest additions to the Crescent Plate Heat Exchanger line. The exhibit will also feature the CP Bantam plate cooler and stainless steel continuous ice cream freezers. A moving display of CP materials handling equipment will also be shown.

Representatives will be present from the 23 branch offices.

Classified Advertising

MAINTENANCE ENGINEER

We have an opening for a young man 30-40 years old, with degree in Engineering and with general Plant maintenance experience. Some knowledge of and experience with refrigeration systems would also be helpful. Send details of education and experience to The Stroh Brewery Company, 909 E. Elizabeth St., Detroit 26, Michigan.

USED EQUIPMENT—wanted & for sale

WANTED — Approx. 100 ton grid ice plant complete. Give vital information and price in first letter. Write Box SP-2, c/o Industrial Refrigeration.

FOR SALE — 4x4, 5x5, 10x10 Fricks. 5x5, 8x8 Yorks, splash lubrication. 7½" and 9" York crank shaft. Write E. Niebling, 1546 St. Clair Ave., Mt. Healthy, Cincinnati 31, Ohio.

FOR SALE — Refrigeration equipment; ice equipment; new, used. Advise us your needs. Use "QUICKSEAL" — stops brine tank leaks; easy, efficient, economical. Born Company, 80 East Jackson Boulevard, Chicago 4, Illinois, WAbash 2-5299

FOR SALE — 1 York 12½ x 14½ ammonia compressor. Very good condition, under care maintenance engineer. Also 1 KW Diesel electric generating set. Make me an offer. L. P. Ilgen, Brook Park, Lewisburg, Penna.

FOR SALE—AMMONIA—FREON
1—3-¾x3"—8 cyl. V/W York belt driven ammonia compressor.
1—5¼"x4¼"—6 cyl. V/W York ammonia booster comp.
1—6-¾"x5"—6 cyl. V/W York booster ammonia comp.
1—25 ton Chrysler Air Temp. Freon condensing unit, complete.
1—40 ton General Electric Freon condensing unit, complete.
1—50 ton General Electric Freon condensing unit, complete.
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10x10 York with 100 h.p. syn. motor.
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FINNED PIPE FOR SALE—61 lengths 12' each. Made from 2" steel pipe-7" square fins 1½" apart; galvanized. New at only $3.00 per foot. Also 100 steel Hand Trucks. Medium duty; roller bearing wheels. New at $6.00 each. West Side Cold Storage Co., 7 Harrison St., New York 13, N.Y.

FOR SALE — Two 13¼ x 9 Frick booster compressors, arranged for synchronous motor drive, less motor & flywheel. Perfect mechanical condition. R. H. Bozman & Bros. Inc., 1050 Granby St., Baltimore 2, Md.

FOR SALE — Two 9x9 Frick ammonia compressors with 75 h.p. motors, V-belt drive 1 60-ton S & T condenser, 1 60-ton brine cooler. The above equipment used on skating rink job and in very good condition. R. H. Bozman & Bros. Inc., 1050 Granby St., Baltimore 2, Md.

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2—10"x10" 2 cyl. Frick D.C. to 100 hp motor.
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3—9"x9" 2 cyl. York D.C. to 75 hp motor.
1—8"x8" 2 cyl. Frick D.C. to 75 hp motor.
1—7¼"x5" Frick booster.
2—50 ton G.E. Freon condensing units.
1—50 ton Buffalo Freon evap. condenser.
1—6"x6" Frick compressor.
1—5"x5" York compressor.
3—9¼x14" 115 hp Wolverine Diesel engines.
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A Vest Pocket Book of Valuable Data REFRIGERATION NOTE BOOK

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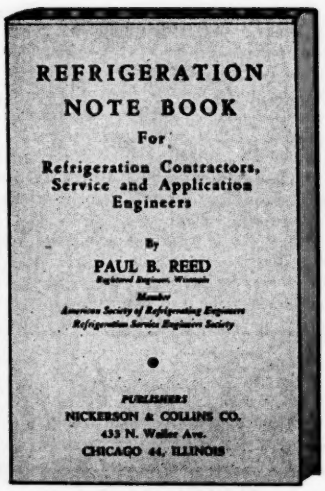

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THIS NOTE BOOK of condensed refrigeration information represents many years of work in accumulating practical data—"culling out" all extraneous material—so as the author states, "the reader will find a handy and easily carried source of information not usually kept in memory."

You will be surprised at the wealth of material that has been included in this convenient and practical reference Note Book. It is written in layman's language, without complicated formulas. In short, it is a tool responsible for the operation of refrigeration equipment.

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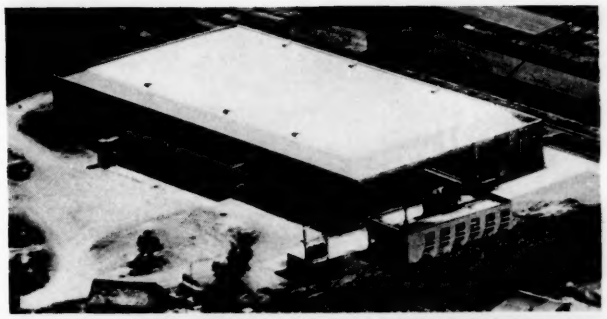

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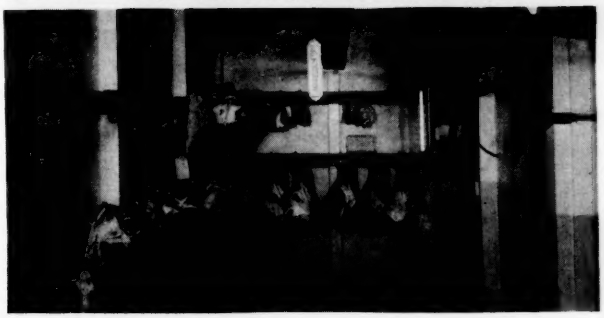

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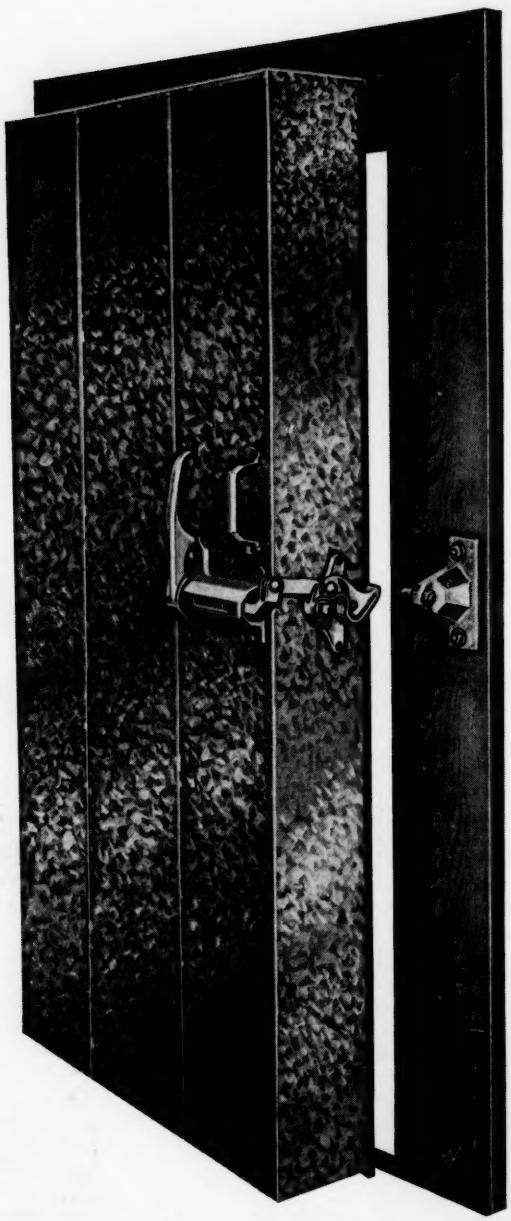
Fiberglas AE-F (Asphalt-Enclosed Floor) Board	Floors only	12" x 36"	2, 3, 4
Fiberglas Roof Insulation	Roofs above low temperature spaces	24" x 48"	2
Fiberglas Dual-Temp Pipe Insulation	Low temperature pipelines	Coverage for ½" to 30" dia. pipes in 3' lengths	Single Layer—1, 1½, 2, 2½ Multiple Layer—No Limit



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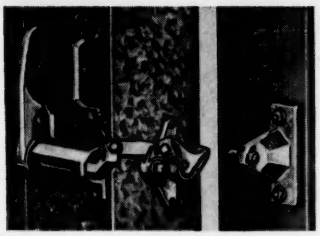

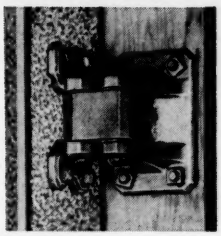

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